Pit and Quarry

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CEMENT-LIME-GYPSUM

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Published every other Wednesday, Chicago, Ill.

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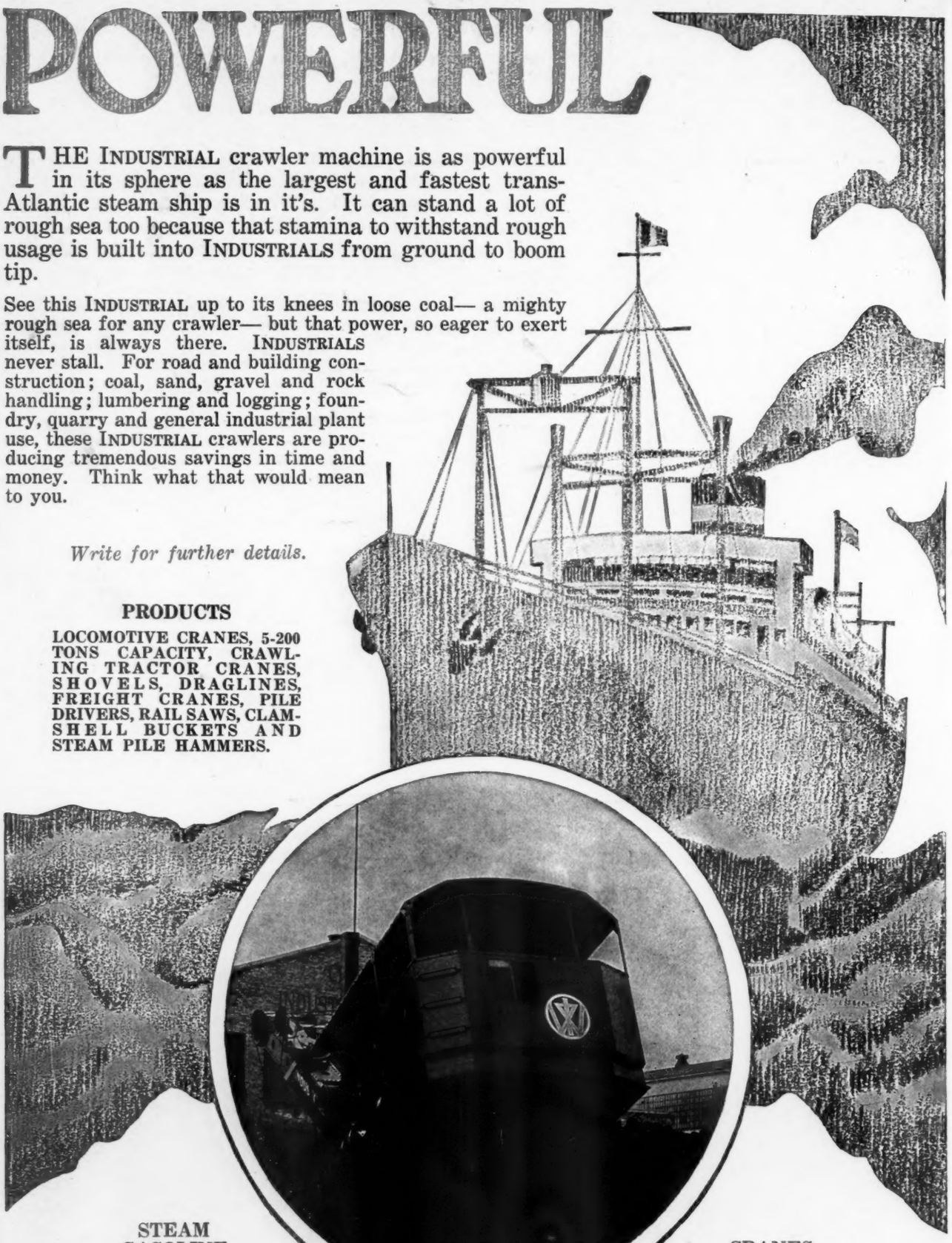

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Pit and Quarry

Published Every Other Wednesday for Producers and Manufacturers of Sand Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.

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Pit and Quarry

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TRADE ASSOCIATION PROBLEMS

ECONOMIC conditions during the past decade have been increasingly difficult and have led business men to turn their attention to the factors which have affected the trend of business progress. The economic value of trade associations has come to be of as much significance in industry as their legal importance. The need of organized action by business men, of the invaluable returns from the pooling of information for the benefit of the group, has grown until it has finally developed the trade associations. The inevitable result is an increasing group strength and harmony of action, a breaking down of distrust and suspicion, and a prevalence of knowledge and understanding of basic economic principles. This coming together of business men in trade associations is beneficial not only to themselves but to the public. It has effected stability in business that is bringing permanency and harmony. Leaders in industry are giving their time and energy to the cause of the increased value of the associations. The idea of harmoniously working together for the benefit of the industry is no longer an idealist's dream but a practical producer's sound conviction.

Trade associations are confronted with various problems which require wise and skillful handling. There are certain so-called inside problems of which the most important is the securing of the whole-hearted and unified support of the industry. However apparent the need of organization may be, there is always an element of self-interest in all of us which must be overcome. The routine of daily work tends to narrow our range of vision. Cooperation in the work of a trade association is ultimately beneficial to every member, but that cooperation sometimes appears in the light of philanthropy. Only men of vision could see in the beginning that what appeared as altruism was in reality individual advantage. Why give time and money for the benefit of the other fellow The answer, of course, is that the other fellow must be won over to the idea of the mutual benefit of the group. Time and money are given for the group and for the industry. If a few plants profit thereby with no cooperation and support, they are either inconsequential as compared with the real worth of the organization or they are potential members who are not as yet in line merely because they are unaware of the trend of progress. They are not selfish and narrow but slow perhaps to grasp the significance of the movement. When they arrive, they often turn out to be the most valuable members of the association.

Another vital problem of trade associations is that of financial support. No enterprise thrives on theories but rather it requires sound business sense. This question of money for operation of a trade association places a great responsibility upon the leaders of the association. The solution of this financial problem must be sought in the concensus of opinion of the membership. If the program laid out by the officers of the association is desired by the membership, they will, when approached, with the problem, supply sufficient financial assistance. The industry should be looked to for financial support. The American Trade Association Executives' definition of a trade association is as follows:

"A trade association is an organization of producers or distributors of a commodity or service upon a mutual basis for the purpose of promoting the business of their branch of industry and improving their service to the public through the compilation and distribution of information, the establishment of trade standards, and the cooperative handling of problems common to the production or distribution of the commodity or service with which they are concerned."

Trade associations based on such sound economic principles are capable of bearing any necessary financial burdens. Producers are a generous, farsighted type of business men; they have confidence in the leaders of the associations and faith in the idea. Consequently, there should be an absence of this obstacle to successful completion of the work of the various associations in the non-metallic mineral industries.

The question of leadership is so important that an association's success and progress is almost certain to be proportionate to the ability and enthusiasm of its leaders. The ideal leader of any enterprise is the man of ideas and vision who can see the ultimate goal in terms of the individuals who comprise the group. Such a man is fearless in accomplishment yet never indifferent to the opinions of individuals nor unaware of the value of suggestion. He can act decisively yet not autocratically; he is self confident without being overbearing. His integrity serves to weld together inharmonious personalities, clashing temperaments, and divergent interests. Such men are devoting

their best thought to enterprises of great importance to business today and of far reaching influence into conditions of the future. Through their influence and that of trade associations there is a possibility that the disastrous phases of the business cycle may be controlled and eventually eliminated entirely. To be aiding in the progress toward such a goal is an incentive and inspiration to any man. There is no present satisfaction or advantage which is comparable with the gratification of knowing that the work belongs to the future. These men are pioneers in relation to the possibilities of coming generations. Leaders in all lines of human endeavor are in danger of criticism and misunderstanding. If the needs of the industry are not satisfactorily handled, the leaders must bear the brunt of complaint. To serve the industry in the best way is the aim of the association and the aim of the leaders.

Of the outside problems of a trade association the most important is probably research work. Collection, compilation, and dissemination of statistics valuable to the industry are services which are comparatively new to business and are of the greatest value. Organized research is just starting and with each successive decade will become more essential to producers. Its future possibilities along lines of economy, efficiency, and business control are unbounded. Scientific achievement has left economic progress far behind, but it will be overtaken as soon as we evaluate correctly the value of research. Furthermore, business will win the respect of the public when it gives evidence of rational methods of procedure along scientific lines. The research programs of our trade associations in the non-metallic mineral industries are most commendable and should be expanded each year. Nothing that the associations have done has been more significant of a broad outlook, or more far reaching in future possibilities for producers. Not only plant operators today but their sons' sons will profit by these scientific methods of building for the future of the industry.

HOMES FOR EMPLOYEES

ENCOURAGING home ownership among employees is one of the most beneficial policies that an executive can adopt. When the worker becomes a property owner, no matter how small the property may be, he becomes a better citizen and a better workman. He develops a sense of responsibility; he acquires habits of thrift; and he thereby increases his value to the organization and to the community. Any improvement in the economic status of the employee raises his value to his employer. Many industrial organizations have worked out plans for encouraging home ownership among their personnel. If such plans are founded on sound business principles free from philanthropic motives or paternalism, the result is entirely satisfactory with greatly increased efficiency and decreased labor turnover. The relation of employer to employee is such that condescension on the one hand and suspicion on the other are easily developed. No relationship between them can be enduring and mutually beneficial unless all dealings are on a strictly practical basis. Any exception to this rule would require a rare personality on the part of the employer and an unusual spirit of loyalty and personal regard on the part of the workmen. General recommendations, however, are not made for the unusual situation but for ordinary conditions existing in most plants.

Many employees would gladly own their homes if they knew how to carry on the venture. The initial payment would, of course, be difficult to meet in many cases, but in others it could be managed if the men knew how to go about it. Fear of entering upon obligations which they cannot carry on deters others who with a little encouragement would be glad to go ahead with plans for acquiring a home. All assistance given by management must be intelligently guided on strictly business principles. Some companies have advanced credit to an employee for the initial payment. The credit carries with it the obligation of a second mortgage bearing the usual rate of interest. The employee then pays off the principal with interest on a monthly installment plan. The employee sometimes takes out insurance for the period of his indebtedness so that his dependents are protected in case of his death. Other companies arrange with the employee a payment of 10 per cent of the total value of the property as an initial investment. This shortens the term of payments. In some cases the initial payment has been 5 per cent. When the company owns a desirable tract of land near the plant, it often becomes practicable to sell lots to the employees on a partial payment plan. Upon completion of the land payments the house can be erected on a mortgage against the property. One company has successfully established a free real estate service bureau at practically no cost to itself. Its aid to its men in their efforts to secure homes has been far reaching and greatly appreciated. The management has gained in innumerable ways by thus offering advice, recommendations, information, and methods of procedure to its men.

Any plan for home ownership must be entered upon with the greatest wisdom on the part of management, but a successful plan will bring desirable returns to the company. There will be less discontent, more earnest work, and a better spirit of cooperation in a group of workmen who have something worth while to work for.

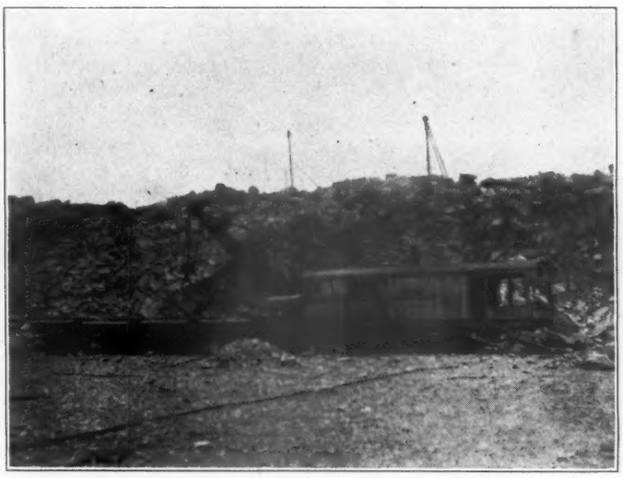
PROBLEM OF CONSTANTLY INCREASING DEMAND SOLVED REPEATEDLY BY THIS COMPANY

By E. D. Roberts

CONSTANTLY increasing demand for a product is often a problem to a company in order to meet the emergency without constructing a new plant. Mr. J. L. Heimlich, president and active manager of the LeRoy Lime and Crushed Stone Corporation of LeRoy, New York, has been faced with this situation many times during the last few years. This situation has caused him to resort to many ingenious rearrangements and additions to the plant machinery so that the output would be increased without incurring a major outlay of capital.

The LeRoy Lime and Crushed Stone Corporation originally produced builder's lime at Lime Rock, New York State. This plant was operated for about thirty years when, with the closing down of unnecessary operations during the World War, the company found themselves practically out of business as builder's lime producers. However, there was an increasing demand for fluxstone and Mr. Heimlich decided to transfer the plant's activities to the production of this war necessity. Accordingly, a new quarry was opened just east of LeRoy, New York, alongside of the Buffalo, Rochester and Pittsburgh, the Erie, and the New York Central Railroads. With the developing of the quarry, the quality of the rock became apparent. The upper rock strata is a high calcium stone, while the next lower strata is very hard. The high calcium stone is, therefore, very desirable for fluxing purposes while the hard rock is especially desirable for roadstone, ballast, and concrete aggregates, ranking with the best in New York State. As these facts became known to the trade, an increasing demand was created, calling for greater production each year until, at present, the LeRoy Lime and Crushed Stone Corporation is shipping annually over 350,000 tons of railroad ballast, concrete aggregates, road stone and flux stone.

As the plant is located on the three railroads mentioned and only three miles to a junction with the Delaware Lackawana and Western and the Lehigh Valley railroads, the company is able to place its product in any of the industrial cities of Western New York in favorable competition with other first rate crushed stone producers of this section. At LeRoy the limerock is found in horizontal strata or bedding planes and does not show any evidence of much earth movement since it was formed by the accumulations of fossils many millions of years ago. About three feet of earth has to be removed in order to reach the rock. This stripping is done by a small steam shovel which



A Quarry View

excavates the earth and discharges it into White dump trucks. These remove the earth and dump it at distant points.

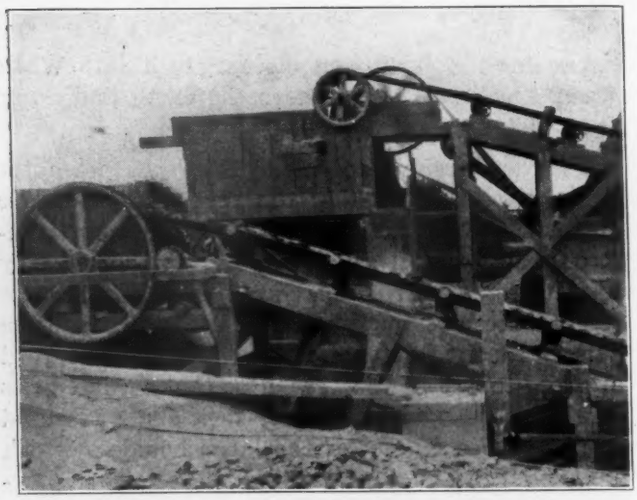
Two well drills are employed to put down the drill holes for loosening the rock ready for the steam shovels. Both of the drills, one an armstrong and the other a Clipper, are electrically operated. The drill holes are placed on 15 foot centers, Hercules powder being used to charge the holes. Electric detonators and Cordeau-Bickford are used to set off the powder so that several holes can be fired at once. Denver rock drills are used to place holes in any of the large boulders which are too large for easy handling by the steam shovels. A small charge of powder in the block holes easily breaks these boulders. Compressed air for operating the rock drills is furnished by an Ingersoll-Rand compressor which also furnishes com-

One of the Main Belt Conveyor Units

Discharging to Crusher

pressed air to operate the car dumper at the primary crusher.

At this plant there are in reality two quarries and two crushing plants, each having a steam



Belt Conveyor to One of the Secondary Units

shovel, cars, dinkeys, initial crushers, sorting screens, etc. The larger steam shovel, a model 90 Marion, furnishes rock for the main crushing plant which produces railroad ballast, concrete aggregates and roadstone, while a model 61 Marion steam shovel furnishes rock for the flux stone plant. As a consequence of this parallel operation, each plant will be described separately.

Note the Construction of the Quarry Car

Main Crushing Plant

Three 18 ton Vulcan dinkeys, hauling 4 Easton improved quarry cars for each train, handle the rock from the model 90 Marion shovel to 30 inch Allis-Chalmers crushers. These receive the quarry run for the main plant. The quarry cars are of the new type recently developed by the Easton Car and Construction Company. This type consists of a jointed lever arm action that causes the door, which is hinged at the bottom, to fold outward as the car turns over. This arrangement forms a chute and causes the rock to fall clear of the car thereby eliminating trouble due to derailments which might be caused by rock falling upon the track.

The tracks are arranged so that there will be a minimum delay at the vital points: the steam shovel or the receiving crusher. The main track runs from the steam shovel past the initial crusher while a return track comes from the main track after it has passed the discharge point. This return track then joins the main track just before reaching the shovel. With three trains in operation there is always one waiting at the shovel and another at the crusher.

As a loaded car is spotted over the crusher, a Curtis air hoist lifts up one side of the car and dumps its contents into a 30 inch Worthington crusher. This crusher has recently been installed and is in a concrete chamber that keeps the water from flooding the large motor which operates the crusher. This new installation, made to increase the capacity of the plant, has been designed to handle a larger output than the present output and will meet the needs of a much larger plant in case further expansion is necessary.

A 42 inch conveyor belt receives the discharge from the primary crusher and carries it up to a second 42 inch belt. This carries the rock up to and discharges it on a Robins Cataract grizzly. Formerly, the belt discharged into a Worthington scalping screen at this point but with the increased production it was found inadequate so the Robins Cataract was installed. This moving grizzly allows all the material, below 2 inches in size, to fall through into the boot of a bucket elevator while the oversize is discharged into the 20 inch Worthington crusher that formerly did duty as the primary crusher. This 20 inch crusher discharges to a belt running at right angles to the original line of flow to a point where it is high enough to discharge on another belt which carries the rock back to the original scalping screen.

The 2 inch material passing the scalper also falls into the boot of the bucket elevator, mentioned

above, while the oversize is fed to a 13 inch Superior McCully crusher for final reduction. This crusher was the original secondary reduction crusher but with the increased production it could not handle the amount of material so the belt conveyor was installed. This conveyor carries the overload to a number 5 Gates crusher installed at the point where the conveyor, carrying the discharge from the 20 inch Worthington to the scalper, reverses its direction. This location allows the Gates crusher to discharge on the second belt of this conveyor system.

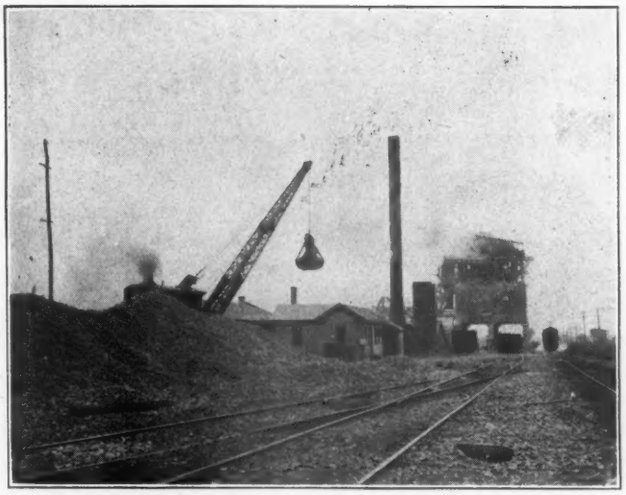
This arrangement may seem to be somewhat complicated, but when it is remembered that the production has been more than doubled without rebuilding the original plant, it will be conceded that Mr. Heimlich has made wonderful and remarkable engineering changes. There is another phase of this plant which has not been mentioned namely, that the original installation was steam operated. When the capacity of the steam plant was reached, it was not deemed economical to replace it entirely by electricity and so the additions are driven by electric power while the older units are still operated by the steam engines. This fact also influenced the retaining of the old equipment in its original form. The bucket elevator, referred to above, carries the crushed rock to the top of the bin structure where it is discharged into a 60 inch by 24 foot revolving screen and acts as a scalper. This scalping screen, an Allis-Chalmers, takes the fines out of the rock and discharges the oversize to 2 Allis-Chalmers 48 inch by 20 foot sizing screens. The required sizes, produced by the sizing screens are chuted into the proper bins below while the fines from the scalping screen are carried up by a short bucket elevator and discharged into two double deck Hummer screens.

These two Hummer screens were installed to produce the properly graded concrete materials required by the Ribstone Concrete Corporation. This firm has a plant located across the track from this crusher unit and specializes in the casting of concrete units to form parts for circular bins. The two grades of material, produced by the Hummer screens, fall into separate circular bins. These were made by the Ribstone Corporation, and are placed on reinforced concrete posts and floor. These bins are located over the two railroad loading tracks, which run under the bins.

The Flux Stone Plant

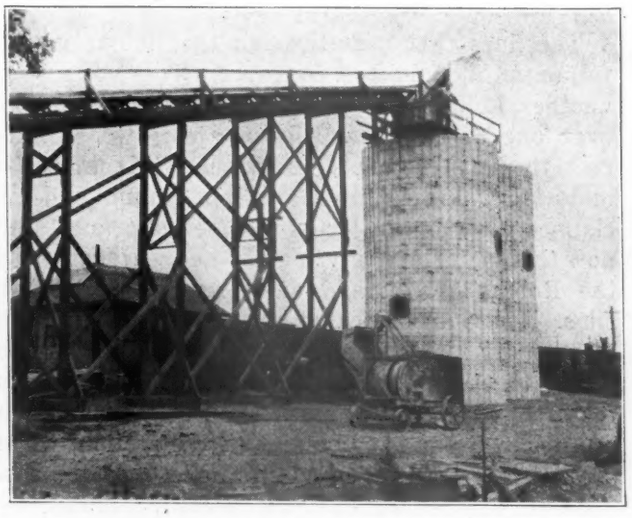
The flux stone part of the company's operations are simple as compared to those of the main plant. The main plant takes and disposes of all the rock below 3 inches in size, or that size which is considered too small for flux stone.

An 18 ton Vulcan dinkey moves the rock, which is only a short distance, from the model 61 Marion steam shovel to the initial crusher. An inclined



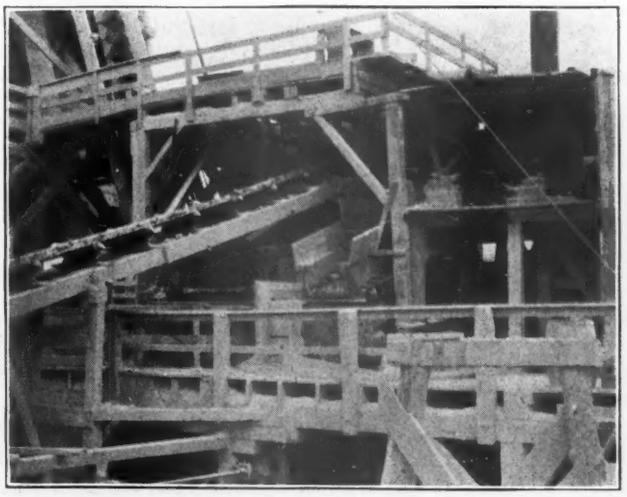
Reclaiming Stone From Storage

conveyor belt then carries the crushed rock from the initial crusher up to a Robins Cataract grizzly. This is located alongside the loading track and high

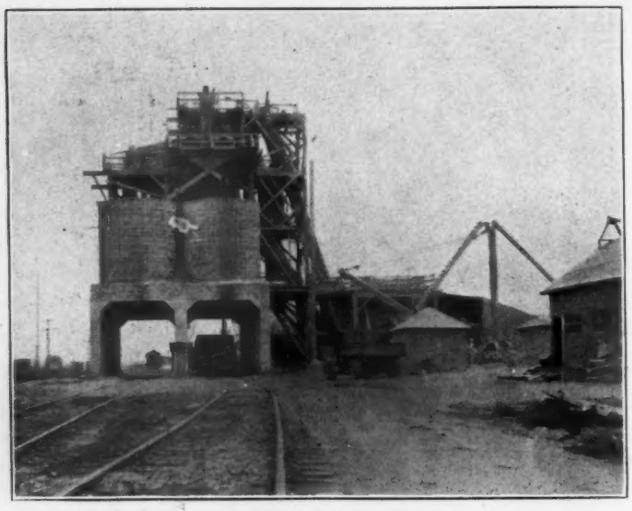


Storage Silos for Fines

enough to discharge the oversize into the car to be loaded. At the point where the belt comes above grade from the quarry, a man is stationed with a wheel barrow. The duty of this man is to pick



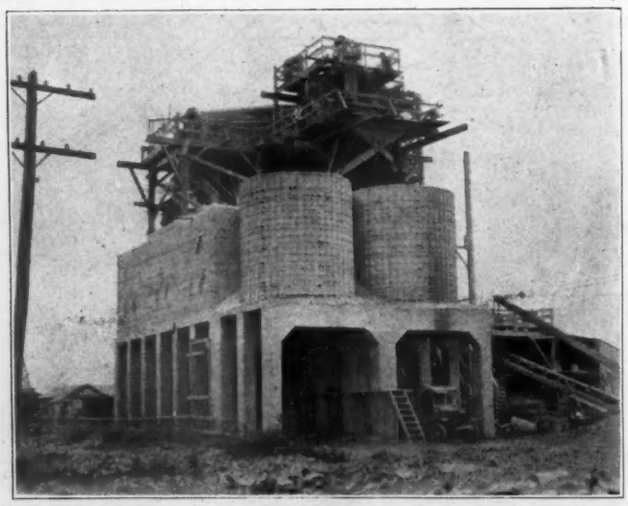
One of the Screening Units



Storage Plant for Loading Cars and Trucks

out all undesirable pieces from the rock as it passes him on the conveyor belt. These rejected pieces are then thrown into the wheel barrow and dumped over the bank into the old quarry.

The fines that pass through the Robins grizzly fall on an inclined belt conveyor. This leads up to another Robins Cataract grizzly which is located over one of two new Ribstone silos which have recently been installed. Previously this undersize material was discharged on the ground and reclaimed later by an Orton locomotive crane. But now this material is given a further segregation by the Robins grizzly and discharged into the two silos. These silos, located on the ground, are built of properly molded concrete sections, which, when placed together, form the section of a tank with a recess to suit another section. Steel hoops which are placed around the outside of the section, when drawn tight by nuts on special bolts, hold the sections in position against the pressure caused by the materials placed in the silo. Gates are placed in the sides of the silos, at a sufficient height, so that the material may be drawn off by gravity into a car spotted alongside the silos. Of course, there is a large amount of dead material in the bottom of the silos but these retain the material and are cheaper than costly fabricated columns of steel or reinforced concrete.



Note the Concrete Construction and the Steel Hoops Around Silos

The fines from the flux stone operations are drawn off into bottom dump gondola cars and handled to a hopper over the receiving belt from the primary crusher in the main plant. The crushed rock is dumped into the hopper and later fed to the belt for reduction and sizing in the main crushing plant.

A 50 ton Vulcan dinkey spots the cars for loading the rock either under the shipping bins of the main plant, the flux stone cars, the cars from the flux stone plant to the main plant or to and from the outside ground storage. At times it is necessary to store some of the stone in outside storage piles which is reclaimed later when the demand is greater than the plant production. An Orton and Steinbrenner locomotive crane is used for the purpose of loading or unloading the stored material.

Mr. J. L. Heimlich is president and active manager of the LeRoy Lime and Crushed Stone Corporation and Mr. Donald Woodward is treasurer. The post office address is LeRoy, New York.

Monthly Building Average Estimated at Five and One-Half Million

With building construction reported as proceeding at a rate of approximately $5,500,000 a month for the first nine months of the present year, the total construction volume for the year will apparently be approximately that reached in the records of the last two years, the National Association of Real Estate Boards points out. Real estate activity for the country as a whole was measured for September by the index figure of 164, according to the statistics compiled monthly by the National Association of Real Estate Boards from official records of transfers and conveyances in forty-one typical cities. The September figure is a recession of five points from the index of August. The index for September, 1925, registered 167. The association's calculations are based on the official records of the forty-one cities for the years, 1916-1923, taken as a norm. The September figure, therefore, indicates that market activity for real estate in the nation as a whole is approximately 64 per cent above the average for that month during the period 1916-1923.

According to the figures published by the Common Brick Manufacturers Association, there were consumed in the United States last year about 8,000,000,000 bricks, or enough to build the foundations, chimneys, and walls for 267,000 average homes.

ACCIDENT PREVENTION WORK CONSIDERED BY CEMENT AND QUARRY OPERATORS

ORGANIZED accident prevention was the dominating influence arresting the attention of all who attended any of the sessions of the Fifteenth Annual Safety Congress of the National Safety Council held in Detroit from October 25th through October 29th. Safety movies, health service, employees benefit, public safety, safety education, safety bulletins and many other general problems of safety and accident prevention work were covered by discussions and exhibits. Three sections of the congress were of particular interest to cement and quarry operations. On Tuesday, October 26th a cement section meeting was held. On Wednesday morning a joint meeting of the cement and quarry operators was held. On Thursday morning a quarry section meeting was held.

Cement Section

The meeting of the cement section was attended by about 200 cement and quarry operators. R. Frame, insurance manager, Alpha Portland Cement Company, as chairman of this section arranged a very interesting and informative program. Three speakers presented papers which resulted in a general and animated discussion of safety and accident prevention work by more than half those present. G. S. Brown, president, Alpha Portland Cement Company discussed "Accident Prevention From the Viewpoint of the Executive." Eugene T. Green, insurance and personnel department, Riverside Portland Cement Company, discussed "The Relationship Between the Physical Examination and Accident Prevention." Edward H. Parry, Glens Falls Portland Cement Company discussed "A Year's Experience With A Borrowed Plan." The address of Mr. Parry appears elsewhere in this issue. The work of the officers of the cement section was so satisfactory that the nominating committee nominated R. Frame, Chairman and T. F. Halpin, vice chairman to succeed themselves and those present elected them unanimously. An unusual feature of the meeting of the cement section was the expression of regret by many upon the resignation of H. G. Jacobsen as manager, bureau of accident prevention and insurance, Portland Cement Association. A written testimonial signed by all present and a gold watch was presented to Mr. Jacobsen at the close of the many individual spoken expressions of his good work.

Responsibility of Management

"Accident Prevention From the Viewpoint of an Executive" was the subject discussed by G. S. Brown, president of the Alpha Portland Cement Company, as the first address before the cement section on Tuesday morning. Mr. Brown's appearance was significant not only because he is the chief executive of a large cement organization but also because he has long been interested in safety. In 1916 he presided as chairman of the cement section of the fifth annual safety congress, and he was also a member of the first accident prevention committee of the Portland Cement Association.

Mr. Brown confessed that his first interest in safety and accident prevention was sentimental and said, "My first interest in this matter changed from the sentimental to the practical during 1910-1911 when the first compensation laws were being discussed by the legislature of New York and New Jersey." The passage of these laws resulted in a determined effort on the part of the Alpha Portland Cement Company to provide safety for its employees and to reduce accidents. Stress was at first placed on guarding the machinery, but it was soon demonstrated that by far the major number of accidents came from the carelessness and neglect of the individual workman. The attitude of the employees was the key to the situation then, and Mr. Brown believes it still is today. The executors of the Alpha Portland Cement Company exert themselves in educating their workmen to the safety idea and are constantly devising plans for continuing and increasing the cooperation of the employee in the safety program. A 1 per cent bonus plan has been adopted by the company with marked success. All the employees of any department which operates for one month without an accident receive a 1 per cent increase in their pay envelopes. While the amount is not large, it demonstrates to the employee that the management is very much interested in accident prevention. This bonus plan indicates the attitude of the management, and the results of the plan have proven that the position taken by the management affects to a marked degree the reaction of the employee. Mr. Brown spoke to the point on this question when he said, "The attitude of the management will determine the attitude of the employee. If the attitude of the management is that of carelessness or intermittent attention to the problem, you can hardly expect workmen to have any other than the same viewpoint. If on the other hand the management takes a personal interest in these efforts, if it shows that it is willing to spend money for the protection of machinery and the education of its employees, it can expect a hearty response from these employees."

The responsibility for accident prevention and safety work was definitely placed at the door of

management by Mr. Brown when he said "There is still lacking on the part of the chief executive the full measure of interest and cooperation. Executives should give more hearty and continuous support to the efforts of those charged with the actual work of educating our employees to safety methods." This statement was one of the most direct remarks made during the entire session of the cement or quarry sections. Coming from one of the foremost executives in the cement industry it clearly charged the executive with a definite responsibility in accident prevention work.

The comments that followed Mr. Brown's address were evidence that all who heard approved. A few suggested the possibility that the bonus system when applied to safety and accident prevention was in a sense a bribe to a man for protecting himself. Several present explained the excellent results secured by the bonus plans in operation at their respective plants.

Mr. Brown indicated the interest he takes in accident prevention work at the various Alpha plants by the following statements:

"While I no longer have the close contact with the operations of our plants that I had in those years, I still have the same active interest in the accident prevention work of our own company and of our industry, and it is a matter of pride with me that not only have the efforts of the Alpha Company had a measure of success, but the work of the accident prevention committee of the Portland Cement Association has also been successful.

"Many different methods have been tried by the company that I represent and by other companies in the industry to stimulate the interest of the men themselves in this work. When we first started work, the greatest stress was laid upon the protection of machinery. I was very soon convinced that by far the major number of accidents about our works came from the carelessness and neglect of the individual who was hurt or of some fellow employee, rather than from unprotected machinery. Therefore, while we continue to follow the suggestions of the various state commissions, as to the protection of machinery, we felt that our real job was to get the cooperation of our employees themselves, and that has been our effort for the past ten years.

"Frankly, it has been discouraging at times to see, that in spite of all we have attempted to do, after the final figures are made up and a review of the results for the year made, we at times seem to have gone backward. In recent years, however, I feel that we, as well as the industry, have made real progress. Shortly after the first of this year we made a careful study of the accident records of the Alpha Company and were far from satisfied with the result. We had, we thought, impressed the executive force with the sincerity of the president and directors in regard to this work, but evidently they had not gotten that fact across to the employees. I came to the conclusion that perhaps a monetary reward would stimulate the interest and enthusiasm of our employees, and after careful consideration by the management and consultation with the operating officials of our various plants, the Alpha Company established what we call 'The one per cent safety bonus plan.'

"Without going into all the details of this plan, it is sufficient to say that if a mill has operated for a month without a lost time accident, the employees of that plant are entitled on each payday, so long as the plant goes without a lost time accident, to an addition of one per cent of their earnings as shown by the payroll. We are much pleased with the results so far. The lost time accidents for the first nine months of this year at the various plants operated by us aggregate 40; the lost time accidents for the same period in 1925 were 94. The number of days lost during the same period in 1926 was 855, and in 1925 there were 1,539 days lost. The days lost per one hundred thousand man hours worked for the first nine months of 1926 aggregate 48, while for the year 1925 the number of days lost per one hundred thousand man hours worked was 494, which includes an allowance for four fatalities.

"We have been extremely fortunate up to date this year, in that we have had no fatal accidents. Whether this safety bonus will in the long run continue to bring good results, time only can tell, but I am convinced that it has brought about a much greater degree of cooperation on the part of our management and employees than has been known in our organization heretofore. This attitude was well expressed by one of our superintendents, who in an address to the employees under his supervision, said, 'When the company not only asks us to be careful but is willing to pay us for looking after ourselves, we certainly ought to comply with its request.'

"It is well known that competition is one of the strongest incentives that men can have, and this incentive in recent years has been used to great advantage in our industry. The trophy of the Portland Cement Association is being worked for by the individual mills of the organization with much interest, and as the competition goes on, I think I can see a distinct increase in interest on the part of our mills. The offer of the trophy by the Bureau of Mines in 1925 called 'Sentinels of Safety' was productive of great interest. The publication of the safety records by the press is of much value. Nothing is more conducive to the morale of a plant than to find that it has been mentioned by the press as having done well in some particular or over a specified time.

"The fatal accident in our industry is our most

serious problem. It is true that a permanent injury is also of serious moment, but the majority of those who receive permanent injuries are still able to earn their living, to care for their families and enjoy life. The fatal accident, however, removes from the family its wage earner; it takes from him the probable enjoyment of many years of life; it results in the disorganization of the home and the lack of education for the children, or makes it necessary to call for help from those charitably disposed. These are the practical results, but it also causes that great sorrow which the death of a loved one always brings to those who are in his circle of friends. The latter is a thing for which no adequate compensation can be made and the report of a fatal accident is the most distressing one that can come to me as the chief executive of our company. Every effort, therefore, should be made to prevent fatal accidents and as we are successful in such efforts we may count our whole campaign successful."

Need for Physical Examination

The Relationship Between the Physical Examination and Accident Prevention was the subject of an address by Eugene T. Green of the Insurance and Personnel Department, Riverside Portland Cement Company, before the cement section on Tuesday, October 26th. This address created some very lively discussion that bordered on debate at times. While some of the views advanced by Mr. Green were contrary to those held by many present they were nevertheless interesting and concerned an aspect of the safety program and accident prevention work that is often slighted in the non-metallic industries as a whole. Let us consider some of Mr. Green's statements.

"The time will come in industry when certain fixed standards of physical condition must be realized. There is just as much reason to require a high degree of physical perfection as there is to demand of an applicant that he be possessed of intellect or skill. We have reached the conclusion at our plants in California that the higher we maintain the physical standard of our personnel the more gratifying will be the results we are attempting to obtain in the matter of accident prevention. I have therefore come to this meeting to urge the necessity not only of a physical examination when an employee enters the service, but likewise, repeat that examination during each succeeding year of his employment.

"A few months ago we conducted a thorough physical examination of our employees, and as a result of those examinations we have come to the conclusion that fewer accidents should be expected from any industry employing men who are selected through that medium than from an industry that entirely disregards the physical status of the men taken into their organization, and who select their men at random. When this practice becomes universal, I believe fifty per cent of this accident prevention problem will be solved. In any event, it occurs to me, some drastic measures must be employed to mitigate the thousands of accidents that occur yearly in the industries of the United States. I am not convinced that any lasting good can come from relying solely on mechanical safeguards and the distribution of accident prevention propaganda.

"It occurs to me that those of us who are engaged in the vocation of the conservation of human life have paid far too much attention to the theory of constructing mechanical safeguards and appointing committees to watch out for the welfare and safe conduct of our men, and in spite of all these precautions and thought and study, we are still faced with the proposition that our efforts have been only in part rewarded, for safety in the industries of the United States still leaves a great deal to be desired.

"In the hope that we might accomplish something toward arriving at the cause of these accidents, we have during the past six months devoted considerable time and thought toward ascertaining what physical defects exist in our personnel. We somewhat disregarded for the time being the effect and concentrated more attention on the cause. By the effect I mean we subordinated the installation of mechanical safeguards for another method by which we sought to reach the cause.

"During the past year accidents which seemed entirely preventable and wholly unnecessary continued to occur. Within a short space of time three deaths occurred at our plant under such circumstances and conditions that we became convinced that a physical inventory of our employees should be made. A man died at the steering wheel of his automobile upon his arrival home after completing the day's work in our plant. A machinist expired while sitting on the work bench in our machine shop, after he had set aside an acetylene torch which he was using. The coroner found an enlarged heart to be the cause. A man was sent to fuel an engine and while sitting astride the water jacket fell to the concrete pavement and suffered a fractured skull.

"Having been confronted with accidents of this sort, we felt that the time had come when we should take a physical inventory of our men and determine whether or not certain pathological conditions existing in them might not be responsible for accidents of this sort. With that end in view we caused to be prepared a physical examination report which we thought was an improvement on other reports which were obtained from large industries and life insurance companies on the Coast. Our report recited the name of the man, the department in which he worked, length of time employed in that class of work, and then contained

a thorough family history of his antecedents. We further obtained a complete history of all the accidents and illnesses which he had suffered during his life. With that history we proceeded to the physical examination of every employee. The necessity of such a report is very obvious. It is pertinent to know whether or not certain ailments which exist might not be directly attributable to some former accident or illness, or perhaps congenital in their origin. We felt that we were entitled to know whether or not injuries sustained elsewhere might not be responsible for physical defects which we found.

"Before a man is hired by us for any service, he is subject to a more or less thorough examination. However, our plant has been in operation for fifteen years, and no subsequent examinations were ever made; so, up to a few months ago we had many men in our service of whose physical condition we were entirely ignorant. Accordingly, two very capable physicians were employed to look over every employee on the job. In my opinion the most essential thing for a comprehensive physical examination is the opportunity of the examiner to examine the patient stripped. One physician made a thorough test of the eyesight, hearing, throat, teeth and tonsils, and then directed the men to the chief examiner who went over them from chest to feet. In addition to this examination we required every employee to submit to a blood Wasserman for syphilis, and unfortunately we found in the personnel of two cement plants over ten per cent of our employees were afflicted with syphilis in some form. While it is true that most of these positive Wassermans came from the Mexican element, it so happens that the Americans were well represented.

"We found running an engine a man with syphilis who only a few weeks before had been subject to dizzy spells while handling the throttle of that engine. He had in his charge the lives of several men and over one hundred thousand dollars worth of plant equipment. We found a syphilitic crane operator whose any act of omission could snuff out the lives of other men. We found one kiln burner who was color blind and who could not distinguish blue from vermillion. His work required him to be in the vicinity of fuel, gas and water lines, all painted a distinct color. In an emergency such as a fire he probably could not distinguish between a fuel line and a water line were he required to put out that fire.

"Over fifteen per cent of our men have actual hernias and over fifty per cent potential hernias. A potential hernia is one which will become actual if the workman so afflicted attempts to lift a heavy object when he is not balanced. To avoid the possibility of actual hernia he must always have both feet on the ground in such a position as to centralize any strain which may come upon the abdominal muscles.

"Out of some seven hundred men examined we found over twenty-six hundred defects, which means that on an average four defects exist in every employee on the job. Now as to this subject of accidents occurring to these men of physical imperfections, we must agree that a man who has syphilis does not have the coordination of mind and body that a normal, healthy employee has. It was observed in many of the ten percent of our employees who are syphilitic that many of them had been injured under circumstances for which no reasonable explanation could be given, or else they contributed in some manner toward the injury of someone else. Syphilis is not a germ as we term germs in the popular sense, but rather an infection of the blood stream. When observed under the microscope these spirochetes of the blood stream are a multitude of black, spiral worms. The blood supply of a body so polluted first attacks the tissues of the brain, next the central nervous system and finally the means of locomotion. A mind cannot remain alert and at the same time undergo the destructive ravages of syphilis. The very fact that the official statistics of the State of California show that seventy per cent of the inmates of our state institutions for the insane are afflicted with this condition should be evidence enough of the wisdom of that statement.

"We found a great tendency toward throat trouble and pyorrhea among the men. It is well known that a pus accumulation in the tonsils or around the teeth causes infection. The kidneys and bladder are required to absorb this infection, and any man whose system is fighting the effects of such a condition is not the same alert, efficient employee he would be if that condition did not exist. His mind is sluggish, his movements are sluggish, for the very simple reason that his vitality is being dissipated."

Mr. Green at this point admitted that there was need for mechanical safeguards, safety committees, bulletin boards, posters, etc., to keep a man eternally vigilant for his own safety but he insisted that these mechanical safeguards would not play such an important part in accident prevention work if the minds of the men are alert and if the men are not hampered with physical handicaps. The body of the man is often subjected to strains even greater than is a piece of machinery and Mr. Green advanced the opinion that often the human body is abused to such an extent that accidents are a natural consequence. An annual inspection of the body of the employee was strongly advocated by Mr. Green and he compared the need for such an inspection with the annual inspection of the plant machinery. He made some

recommendations and discussed possible reactions by citing the experience of his own company.

"Every plant should enlist the assistance of the plant physician, not only when a new employee comes to work, but also every year while that employee remains in the service, he should have a physical examination. Such defects as are found should be remedied before they become serious, before they put a man in such physical condition and frame of mind that he becomes a target for an accident.

"This apprehension which employers feel toward the reaction of their employees when they ask them to submit to a physical examination is without foundation. Our men met this request with enthusiasm, and when recommendations were made to them by our doctors for the care of their health and the correction of conditions and habits which existed, these recommendations met with whole hearted response. We have a benefit fund for our men to which each employee contributes in proportion to his earnings. This fund entitles the men to hospital and surgical care when they are ill or sustain injury outside the scope of their employment. This fund has been in existence over ten years, and a reserve well into four figures has accumulated. The men realized after these examinations were made that the entire amount they had accumulated could quickly have become dissipated if certain chronic conditions which were found were permitted to continue uncared for.

"We have been asked whether or not our employees objected when we required them to submit to a blood Wasserman. There was not one protest, so you must realize that men these days are concerned about such things, and thinking men everywhere have come to the conclusion that there should no longer be any mystery about this affliction, for there is no scientific data about its acquirement to justify the odium which befalls its victim. Many people guilty of no moral transgressions are numbered among its victims. In cases where we found that condition, we obtained for the men a reduced medical rate and they received treatment for this condition at cost. While they continue in their efforts to rid themselves of their affliction, they may remain in our employ.

"The whole success of this periodic physical examination depends upon the assurance of the employer to his men that he is actuated primarily for their own welfare and in that he must be sincere. If defects are found which warrant a change of jobs, the change should be made. Men should be placed at work which their physical handicaps and limitations permit them to do. However, the whole scheme will collapse and fail if it is used as a weeding out process, and its purpose will be defeated if these measures are resorted to. There should be no necessity in any well organized plant to follow that procedure. Second, the men owe a duty to their fellow workers. Third, the desire of the company is to keep its employees in such physical shape that they may be able to work steadily, and their efficiency not be impaired. Finally, the frequency of accidents is lessened."

Mr. Green did not cover all the benefits to be derived from a periodic physical examination but the experiences which he related were sufficient to indicate the practical results which can be expected by making the physical examination a part of any accident prevention program. He made the statement that the physical inventory taken by his own company had been made at some expense but that the company had already been more than fully repaid for the financial expenditure.

During the discussion which followed several in attendance approved by their experience the value of the plant doctor but were divided in their opinion as to whether or not this doctor should be in attendance at the plant for a stated time each day or should be available for call to the plant and receive minor cases at his office. The need for having the plant doctor in the employ of the company and insisting upon his cooperation was demonstrated in two or three instances when individuals present spoke of the difficulty they had experienced with doctors permitting the injured man to largely determine the length of absence from work.

Joint Meeting

The joint meeting of the cement and quarry sections on Wednesday was especially well attended. About 200 were present. E. E. Evans, president of the Whitehouse Stone Company and chairman of the quarry section occupied the chair at this joint meeting. Two speakers and a round table discussion featured the program.

"Safety In the Cement and Quarry Industries" was discussed by Dr. R. H. Lansburgh, secretary of labor and industry, State of Pennsylvania. This paper is published elsewhere in this issue. The questions and discussion which followed this paper demonstrated a desire for information. The use of the life line was the principal point of discussion. During this discussion Mr. Lansburgh strongly recommended public hearings on safety codes and warned against inserting specific provisions in the code and urged that where provisions were provided that they be subject to modification by petition at any time. The safety code should be based upon the best practice in the state.

H. L. Williams, consulting engineer, Williamsport Wire Rope Company presented a paper entitled "Wire Rope and Its Use Today." This paper is published elsewhere in this issue.

The Round Table Discussion considered three subjects:

(a) How to Protect Workmen with Regard to Storage Bins.

(b) Protecting the Individual Versus Guarding Machinery in a Stone Crushing Plant.

(c) Advantage of Inspection Trips to Other Plants.

The discussion of the first of these subjects clearly revealed the fact that the dangers men face in working around storage bins are not generally realized. H. G. Jamieson insisted that men should be compelled to use a life line when working in the bin and another man should be stationed to watch each man working in the bin. Mr. Robertson cited the circumstances of a bin accident at one of the plants of the Canada Cement Company which might have been prevented had one man been stationed to watch each man in each bin instead of one man to watch six men in as many bins as was the case. H. E. Hunter of the U. S. Gypsum Company at the Fort Dodge, Iowa, plant stated that the foremen of his company are responsible for the key to these bins which are locked at all times except when the foreman authorizes the opening. The foreman unlocks the bins and goes up with the man into the bin. Mr. Denman of the Alpha Portland Cement Company told how his company uses air to cave in material in the bins. Mr. Wagner of the Lehigh Portland Cement Company suggested a ¾ inch gas pipe about 12 feet long with a sharp tool on end for breaking the stone up in the bins. An important point was brought out in the discussion in regard to the life line. The line should not be too long otherwise the man can be smothered. A line that can be adjusted by the man himself was stated by several to be practical.

The second question resulted in many differences of opinion. However, the sentiment seemed to favor the thought that protecting the individual through education of the hazards was more important than a completely guarded machine. Testimony was presented that proved that accidents could happen even when the machinery was completely guarded. The individual certainly is as important as the machine and he should be educated to the hazards of his work and in the use of such safety precautions as are known. After all, the whole discussion can be summed up in favor of educating the employee and protecting him even though all the machinery is absolutely foolproof.

The third question did not provoke the discussion anticipated. The majority present seemed to think that the practice of visiting other plants for purposes of comparing notes was very general. The plan is certainly commendable and should possibly be considered of more importance and should be a part of the program of each company.

First Aid

Jay E. Thompson, secretary of the Toledo Safety Council and whose initiative was instrumental in E. E. Evans and Don C. Souder promoting the quarry section of the National Safety Congress gave a very interesting demonstration of First Aid at the Quarry Section on Thursday, October 28th. The finger shut-offs were the basis of his remarks and the fourteen points which he discussed and demonstrated are so practical that they should be posted around the plant in conspicuous places.

1. Close simple cuts by placing finger on either side and closing lips of cut and holding until it has sealed itself.
2. Cuts in palm of hand. Close fist of victim and elevate hand higher than the heart.
3. Cuts in wrist. Place finger on each side of cut and press down hard.
4. Cuts in throat. Treat in same manner as cuts in wrist pressing back against the bony structure of the throat or neck.
5. Artery cuts in forearm. Grasp arm above the elbow holding fingers flat underneath the arm, applying pressure with thumb on top so as to collapse artery against bony structure of the arm.
6. Cuts in upper arm. Place finger in V of shoulder blade and press firmly back in the point of the V.
7. Cuts in upper leg. Apply shut-off with the heel of fist in the middle of the groin. This shut-off is similar to the V shut-off in shoulder blade.
8. Cuts below the knee. Place fingers of both hands in hollow of knee with thumbs on top and apply pressure as in 5.
9. Multiple cuts of the scalp are shut off by passing a cloth or belt around the head and applying pressure with the thumb and fingers, thus collapsing the vessels running over the top of the skull.
10. Puncture wounds are shut off by placing fingers or thumb in the wound.
11. Broken leg. Place pad between knees of victim and then tie the two legs together by means of four bandages, one just below the hips, one above the knee, one below the knee, one at the ankles and then tie the toes together to prevent twisting.
12. Broken arms or shoulder blades. Secure broken arm or arm of broken shoulder to torso of body.
13. Fainting. Either pull the head down between the knees, or push knees up against the chest of victim to bring back to consciousness.
14. Resuscitation. To start a person breathing you must squeeze the breath out of him and then release so that the air can rush in again. This must be done at the same rate of breathing as you yourself breathe.

The Quarry Section

The quarry meeting on Thursday was attended by about one hundred quarry operators. The program was well selected and all who attended profited. Both Mr. Evans, the chairman and Don

(Continued on page 88)

LEICESTER LIME CORPORATION OF VERMONT USES GOOD MANAGEMENT IN PRODUCTION

By F. A. Westbrook

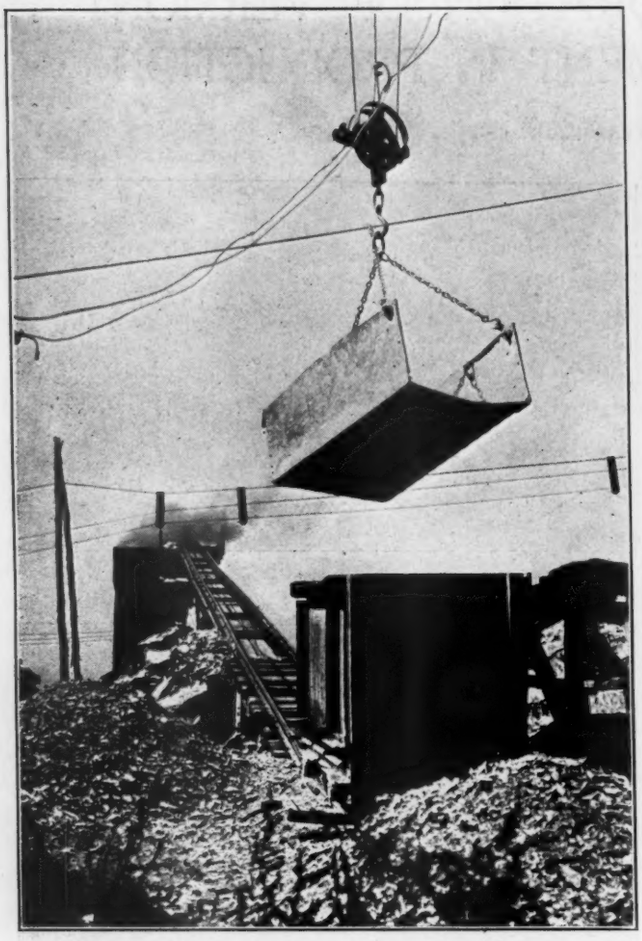
THE Leicester Lime Corporation, owned by Mr. A. F. Mortreoney, has a very modern plant with Mr. C. E. Martin, superintendent, located in the Champlain Valley at Leicester Junction, Vermont, on the main line of the Rutland Railroad. That a fine grade of lime is produced is attested by the fact that more than 60 per cent of the 250 ton production per week is sold to the paper mills of Maine and New Hampshire. The quarry is a large one, and a cableway extends the length of it, from the foot of the incline to the top of the kilns. The stone is sorted by hand and placed in skips, made by the Holmes Iron Works. These are hoisted up to the foot of the incline and discharged into a Holmes Iron Works side dump car. Both the skips and the dump car are operated by one man in the hoister house.

The hoisting engine is an improvised affair assembled on a heavy base made by the Fair Haven Foundry and Machine Company. There are two drums for the cableway and one for the incline which are operated by a 30 h.p. General Electric induction motor. A 9x8 inch Sullivan Compressor, driven by a 25 h.p. Allis-Chalmers motor is also located in the hoister house. This supplies the air for drilling. The drilling is done with Sullivan jack hammers which are also used for pop holes.

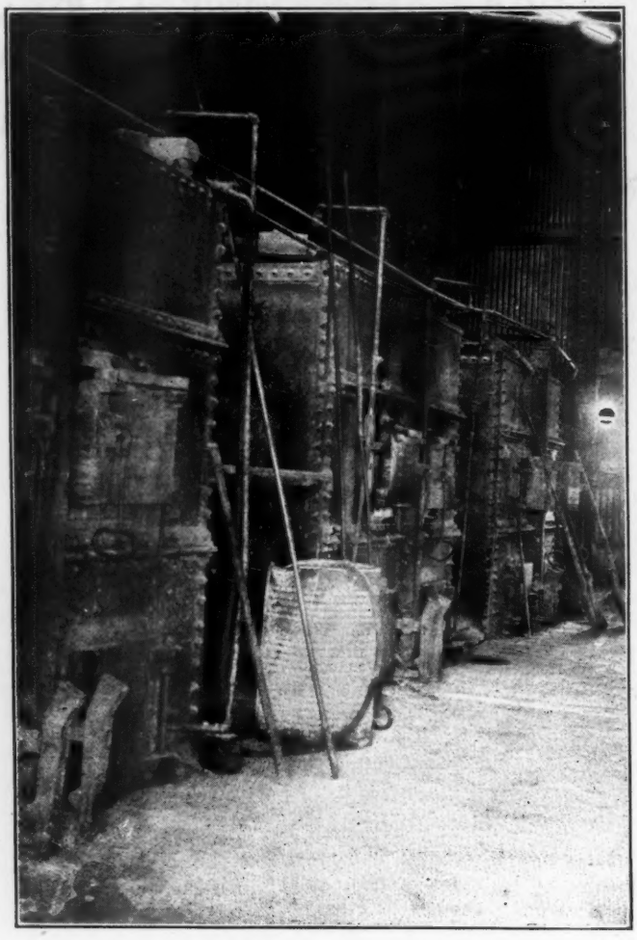
View of Cooperage Shop

Motor Driven Hammer Mill for Making Ground Lime With Elevator at Right

View of Quarry Showing End of Cableway



Incline to Tops of Kilns Showing Skip and Car



View Showing Firing Floor of Kilns

View of Steel Kilns with Steel Trestle Leading to Top

For big blasts the holes are drilled 12 feet deep, 4 feet apart and 3 feet back from the breast, 40 per cent Trojan dynamite being chiefly used.

There are three Arnold and Weigel kilns named "Annie", "Alice", and "Bessie", after the old kilns in another building which have been abandoned. Evidently the original lime burners who started this operation many years ago asserted their New England individuality by giving their kilns names instead of numbers. This method seems to appeal to the present management and doubtless there is more inspiration in the idea of tending Annie, Alice and Bessie, than if the kilns were called just one, two and three. Illustrations are presented which show the lime drawing floor and the firing floor for the three kilns. It is a noteworthy fact that the extreme neatness which is apparent in these pictures was not due to an expected visit. It is the result of good management.

Steam is normally supplied by a Nagle Engine and Boiler Works horizontal boiler. Coal is burned almost exclusively for fuel. A good deal of steam is required for the stone found in this quarry as it takes a pressure of from 5 to 15 pounds depending on the amount of lime produced. The coal is brought in freight cars and dumped into a pit. It is then loaded into Insley side dump cars and hauled up an incline by a motor to the firing floor. There is an incline for each side of the row of kilns as they are fired from both sides. However, as the water supply occasionally runs out in summer so that steam cannot be used in the curing, wood is mixed with the coal.

The lime turned out at this plant is ground for

Incline for Bringing Coal from Storage Hopper to Firing Floor

Lime Drawing Floor. Note Steel Construction

Top of Elevator Associated with Hammer Mill Showing Chutes Extending to Storage Bin

mason's lime or finishing lime or for laying bricks. For the grinding operation a Sturtevant hammer mill has been installed in the building where the old kilns are located. The ground lime is elevated by a Sturtevant elevator to a storage tank which is one of the abandoned kilns. There are two chutes from the top of this elevator, one for loading the tank and one for loading freight cars in bulk. Another chute at the bottom of the old kiln is used for loading barrels.

All shipments are made either in bulk or in wood barrels obtained from the International Cooperage Company. A spur from the Rutland Railroad passes between the building housing the active kilns and the building where the ground lime is made and stored. It is thus a simple matter to load the freight cars with either lump or ground lime. Coal is also brought in over this same spur and dumped at the back of the kiln building.

The new building for kilns is sheathed with Armco corrugated galvanized steel and a similar product made by the American Sheet & Tin Plate Company known as Apollo Best Bloom. The ceiling over the drawing floor is covered in a similar manner. There is also a cooperage shop where the barrels are assembled, and a repair shop equipped with a Buffalo forge and an Ingersoll-Rand hand shanking machine number HSD89.

In order to meet the shortage of water for the boiler at certain times of the year, an effort is now being made to remedy this by drilling a well. For this purpose, an Olds gas engine has been placed on a truck which operates by means of a special rigging to drill the hole. This home made drill is working very well, and it is planned to use

Railroad Spur Passing Between Kiln Building and Grinding Building

it for future prospecting work.

In order to speed up the quarry operations an improvement is planned for the near future in the substitution of an inclined track to the bottom of the quarry for the present cableway. By this change it will be possible to have a switch at the surface so that car loads of rubbish can be shunted off at the top of the quarry and taken to the dump. It will also be possible to fan out tracks to different points of the working face which can then be reached more efficiently than with the cableway which extends along the center of the pit with the work at the sides usually some distance away. Also transfer of stone from the skip to the car on the incline will be eliminated with its attendant loss of time. The present hoisting machinery will be found adequate for this work and three additional dump cars will be purchased.

Kinney Says Hoover Code Committee Saved Florida Many Millions

After an exhaustive study of the effect of the Florida hurricane on houses and other structures in its path William M. Kinney, general manager of the Portland Cement Association, warmly praised the building standards of the U. S. Department of Commerce as a practical means of minimizing in the future the effects of such catastrophes. Mr. Kinney has been a close student of building methods and a member of leading American technical societies for nearly twenty years.

"We have refrained from talking about Florida up to this time," said Mr. Kinney, "through a desire to wait until a thorough examination could be made and reports received from engineers sent to the scene. Unfortunately, some of the earlier statements gave the building public quite an inaccurate picture.

"Practical builders look upon any storm which approaches the intensity of the recent hurricane as almost beyond the range of human power to foresee or provide against. We are told that the barometer went lower than was ever recorded in the United States. The wind whirling along at 150 miles per hour, drove great waves seven to fifteen feet high over the area, undermined structures and drove marine craft and other heavy floating objects against the buildings with incalculable force. Seven to fifteen inches of rain fell in a few hours. While experience in previous extreme tests justified experts in their opinion that reinforced concrete construction would meet the test perfectly as it did in this case, that dwellings in any great number should withstand the onslaught may be considered remarkable.

"Therefore it is a very gratifying fact that domestic structures built in accordance with the building code of the U. S. Department of Commerce came through the storm almost undamaged. Certainly no stronger endorsement of the expert work rendered by Secretary Hoover's Code Committee can be found than in the examination of structures known to have been built according to its requirements for residential construction.

"The most striking example in the entire storm area is found at Coral Gables, where there is a group of about 3,500 residence, apartment and hotel structures, all of which have concrete block walls clad with artistic colored cement stucco. These buildings, erected under the supervision of the Coral Gables architect, in accordance with the Hoover Code, came through the storm without a single case of destruction or anything more serious than slight superficial damage. These houses were directly in the path of the hurricane, as shown by the fact that trees and landscaping in the town were damaged to the extent of over a million dollars.

"Judging by the devastation to building communities surrounding Coral Gables on every side, the property losses prevented by the use of substantial materials and adherence to these well recognized standards, easily may be placed at twenty-five to fifty million dollars for Coral Gables alone."

Predicts Completion of Federal Aid Within Next Two Years

An addition of 3,338 miles has been made to the Federal Aid Highway system during the present year, according to the American Road Builders Association. The total mileage under the system approved by the United States Bureau of Public Roads now totals 182,135 miles.

Of this 182,135 miles, approximately 140,000 miles have already been improved to some degree, with appropriations totalling $150,000,000 available for 1928 and 29 construction, the Association said. To secure full benefit of the $150,000,000 appropriation the states must make an additional investment in their Federal Aid roads of approximately $190,909,000.

Charles M. Upham, Managing Director of the American Road Builders' Association, predicts the completion of the present Federal Aid mileage within the next two years. He said, however, that a large portion of the roads already completed will have been outgrown by traffic and need further improvement by that time.

Plans to carry out the construction of the remaining 42,135 miles included in the Federal Aid System as urged by the Bureau of Public Roads will be discussed at the Road Congress at Chicago during Good Roads Week, January 10th to 15th. The American Road Builders' Association plans complete support to the government's effort to fill in unimproved gaps on the gigantic system of roads, and eventually to extend it to the 200,349 miles permitted by law.

FINANCIAL ASPECTS OF THE SAFETY MOVEMENT IN THE CRUSHED STONE INDUSTRY

By A. T. Goldbeck, Director, Bureau of Engineering, The National Crushed Stone Association*

MERELY to consider the financial aspects of the safety movement to the exclusion of the more vital phases of safety, seems almost unhuman. The complete subject of safety, however, looms up as a tremendous one when all of its ramifications are joined together. Each phase merits detailed study, the unhuman as well as the human, for their individual development cannot but advance the entire safety movement.

If one is to consider fully the financial aspects of safety in the quarry industry it is quite necessary that an analysis be made of a great many individual factors entering into the problem. It will be apparent that although many of the effects of a safety program are definite in character and may be accurately evaluated, there are a number of other effects which, although resulting in financial return, are difficult to evaluate.

As one crushed stone producer very aptly puts the matter, "**** Any campaign for betterment of conditions in which you are able to enlist the interests of all your men stimulates their minds; makes them favorable to the problem in hand and develops the team spirit and the desire to win, and we find that safety campaigns are no exception.***" He points out that through their safety campaign they are inducing a team spirit in their men with a resulting double benefit, less accidents occurring and more and better protection ensuing. The installation of safety devices assists directly and indirectly in the betterment of operation. Such devices protect against machinery and they establish more confidence in the minds of the men. The men thus become assured that the company is trying to protect them from injury and such protective devices are also a stimulant to cleanliness and cleanliness stimulates better workmanship and pride in the men, to the end that much better operation results.

When severe accidents occur, invariably the morale of the workmen is much lowered and production suffers for an indefinite period thereafter, even though the men do not actually quit work for the remainder of the day as so frequently happens. These are intangible things in that they cannot be evaluated but there can be no doubt of their financial bearing. As has recently been pointed out (1) The total or complete economic cost of human accidents must include:

(a) Premiums paid for compensation insurance to cover compensation paid for lost time and cost of hospital and medical attendance.

(b) The portion of the lost time wage suffered by the workman for which he is not compensated.

(c) The lost time and delayed production caused by the numerous occurrences of the production accident, represented by the human accident.

(d) The lost time and the temporary decreased production resulting from the breaking down of the morale, etc. (especially large if the accident results in a fatality).

(e) The lost time and delayed production resulting from the breaking in of a new employee.

(f) The increased liability of human and production accidents happening to or caused by the new employee.

(g) The economic loss through the killing of a workman who has no dependents. Few state laws require any compensation except burial expenses to be paid for fatalities to persons having no dependents.

(h) Incomplete compensation for fatalities. It is estimated by the U. S. Bureau of Labor statistics that the economic loss through a fatality is 6,000 shifts. If each fatality was compensated for this amount of time at one-half time wages, using an average wage of $5 per shift, the compensation for fatality based on the economic loss would be $15,000 but the average actual compensation paid for each fatality is about $3,000.

He further estimates that if the above items are considered in the cost that the loss due to human accidents in industry is as great as, if not greater than, five times the amount paid out in compensation for lost time wages. It is quite evident, therefore, that the losses sustained by the employer extend far beyond the mere payment of insurance premiums, although even this item is a very considerable one whose reduction would be well worth the effort. Such premiums are of necessity based on accident experience records and this is fundamentally so whether the insurance is carried with an insurance company or whether the producer is carrying self insurance. Experience records must serve as the basis for the control of yearly insurance premiums and if the accident experience record is a bad one in any industry the premium rate must be correspondingly high to permit the insuring company to finance the accident cases and continue to do business. Obviously if a group of producers is to enjoy a low insurance rate, that group must demonstrate that such a rate will properly care for the accidents, which past record indicates are likely to ensue. A low accident experience is therefore necessary to bring about a reduction in premiums and this can result only through the development of safety measures and the carrying

1. "Measurement of Accident Prevention by Compensation Insurance Rates," by Byron O. Pickard, (Pit and Quarry, March 15, 1926, p. 61).

*Presented before the Quarry Section of the National Safety Congress at Detroit, October 28, 1926.

on of safety campaigns in ways such as are being discussed at this conference.

It might be interesting to cite the experiences of others to show the financial benefits accruing from the adoption of safety measures. In a certain mining district, safety work was started in July, 1924. During the year 1924, the district produced 1,044,554, tons of concentrates and during the year 1925, 1,507,450 tons of concentrates, an increase of 44 per cent. During these same periods the accidents increased only 28 per cent and, furthermore, the "Lost Time Accidents," that is, accidents in which the miner lost more than the day on which the accident occurred, were decreased from 59.2 per cent in 1924, to 38.9 per cent in 1925. Comparing similar statistics it has been found that whereas during the last six months in 1925, 28 mines produced on an average of 1733 tons per accident, during the first six months in 1926 these same mines produced 2051 tons per accident. Furthermore, the percentage of "Lost Time Accidents" was decreased from 42.8 per cent for the last six months in 1925 to 37.2 per cent for the first six months in 1926. In addition to this, a study of the costs of insurance showed that whereas during 1923 nine of the cooperating companies were paying $5.04 to $8.47 for compensation insurance, on a $4.06 base rate per $100 of payroll, in 1926 these same companies were only paying from $4.18 to $6.52 per $100 of payroll on a $6.25 base rate. In other words, had the experience rating of these companies remained the same for 1926 (on a base rate of $4.06 per $100 of payroll), their insurance would have cost them from $7.75 to $13.04 instead of the present cost of $4.18 to $6.52 per $100 of payroll.

It is stated in connection with a particular mining and smelting company that the question of safety has been given very careful consideration during the past two years and the results of their efforts have been very gratifying. During the year 1925 the actual cost of carrying insurance on their property was $2.30 per $100 of payroll, including the cost of adjusting and medical and figuring their insurance on a basis stipulated by the rating bureau for their classification, have made a saving of 51 per cent. For the first eight months of 1926 their actual cost per $100 of payroll has been $2.10. Including cost of medical, adjusting and miscellaneous their saving below the classification rating will be approximately 60 per cent.

The financial savings to this company on account of various safety measures and the whole-hearted cooperation they have been able to obtain from their department heads and their foremen in making all working places safer, has been entirely satisfactory and more than was anticipated.

During the first six months in 1924 the lost time on account of injury was 1,678 days. The income of the employees losing this time would have been $5,104.72. The total compensation benefit they received was $2,688.54 leaving a net loss to their employees of $2,416.08 or over $400 per month.

During the first six months in 1926, or after the various safety measures had been enforced for one year or longer, the total lost days on account of injury were 1,073. The income of the employees losing this time would have been $3,245.33. The compensation payments on account of lost time were $2,095.04, leaving a net loss to the employees of only $1150.29, or less than $200.00 per month, or just one-half of the monthly loss two years before when safety measures were not so thoroughly undertaken.

It is said that accidents in the construction industry cost that industry $120,000,000 annually. Judge Gary of the U. S. Steel Corporation says that "Accident prevention is not only good morals and good ethics, but also good business."

J. W. Robinson, Secretary, Construction Section, National Safety Council, cites a number of cases in which financial savings have resulted from the adoption of safety measures. Thus, as a result of "Accident Prevention" efforts James Stewart & Company, Inc., has secured a credit of 64 per cent on its insurance rate, or a saving of $2,800 on each $100,000 of payroll. Fred T. Low & Company, Inc., has reduced its accident rate 76 per cent. In ten years the U. S. Steel Corporation expended over $9,000,000 for accident prevention which netted them a return of over $14,000,000. The Bell Telephone Company of Pennsylvania and associated companies in ten years increased the average number of employes from 3,703 to 7,796, while the days lost due to accidents decreased from 6,883 to 1,396. The American Car and Foundry Company expended in 14 years approximately $1,000,000 for accident prevention work. After auditing their books they show a saving of $2,700,000 represented by reductions in liability and compensation payments. These are very definite cases where considerable financial savings have been effected through the adoption of definite safety measures and by the carrying on of well regulated safety campaigns.

One crushed stone producer in the middle west gives his experience as follows:

"At the beginning of the 1926 operating season we undertook to work along the lines suggested by the National Safety Council using their posters and bulletins at the plants and having foremen caution workmen with reference to their own safety and installing additional safety devices wherever possible. The direct result of this effort is shown in the following figures taken from our last year's report up to October 1st, 1925. Accidents from which employees lost one or more days work, twenty-seven. Accidents reported for which no time was lost excepting for first aid, fourteen. Our 1926 records taken up to date show only fourteen accidents from which employees were compelled to

stop work for one or more days and twelve accidents from which employees lost only time necessary for first aid.

"These figures seem to indicate that our safety program has had practically no result as far as minor scratches and bruises are concerned but that practically one-half the serious accidents have been eliminated. We are so well satisfied with this program that we are planning to inaugurate organizations among the employees themselves for the promotion of safety at the beginning of next year's operation.

"Aside from the humanitarian viewpoint this reduction of serious accidents will reflect itself in reduced compensation premiums and in more efficient and unbroken operation. Whenever a serious accident occurs the workmen are not fit for duty the rest of the day. Things are wholly disorganized and production greatly reduced for the time being. We are thoroughly convinced that we can afford to spend a considerable amount of time and money to promote safety from both humanitarian and financial viewpoints."

H. G. Jacobsen of the Portland Cement Association has stated that the cement industry has saved several hundred thousand dollars over a period of the last five years due in part to many of the members companies carrying their own insurance and also to obtaining a complete revision in basic rates. In one case a particular company had just completed a new plant about two years ago in a state where there was no other cement plant and the rating bureau in that particular state applied a most excessive basic rate to this plant. This matter was taken up on the basis of experience records with the result that a reduction in the insurance rate of more than 40 per cent with a corresponding saving to the member company of more than $4,000 per year was brought about.

Is more evidence needed to demonstrate the fact that safety does pay big financial returns? If such huge industries as represented by the United Steel Corporation have found savings of millions of dollars over a comparatively short term of years, does it seem unlikely that another huge industry, the crushed stone industry, will not have a corresponding experience if a thorough safety campaign is undertaken?

Power Show Has Educational Value

The educational value of the Fifth National Exposition of Power and Mechanical Engineering is being developed to the utmost. This annual event brings together not only the leaders in engineering and industry but a great many of the general public who desires up-to-date information about the development of applied science.

The exhibits themselves which consist largely of working units or models will have a great educational value. In addition the management is providing a complete program of motion pictures showing a number of the large developments which cannot be brought to the Grand Central Palace for display at the time of the Show.

Three exhibits of special importance are being prepared. One will show the spectacular use that may be made of vertical sailing shafts for sails by which to propel sailing vessels. The Magnus effect which was demonstrated practically by the rotor ship which visited New York in May, 1926, will be explained by the use of many models and the use of interesting moving pictures. The second important educational exhibit is a method of laying out piping of power plants by isometric drawings. The third exhibit will be under the auspices of the Museum of the Peaceful Arts, which is engaged in the development of plans for a great industrial museum in New York City.

Five hundred exhibitors will occupy the four floors of the Grand Central Palace in this great exposition of all types of mechanical equipment which will be held during the week beginning December 6, 1926. The show will be paralleled by meetings of two great American technical societies. The American Society of Mechanical Engineers will hold its meeting in the Engineering Societies Building during the first four days of the week and the American Society of Refrigerating Engineers will hold its sessions at the Hotel Astor for three days starting Tuesday, December 7, 1926.

Traffic Congestion Costs Excessive More Than One and a Half Billion

Traffic congestion costs the United States in excess of $1,600,000,000 annually, or more than the entire expenditure for highway construction on the total 3,000,000 mile system, according to the American Road Builders' Association. This statement was issued by the organization to emphasize the need for wider highly signallized city streets and highways.

Expert statisticians estimated after careful study that the traffic congestion in the city of Chicago alone costs that metropolis $18,000,000 annually, not considering the enormous property loss resulting from automobile accidents which would have been avoided had a free flow of traffic existed. As a result of these conditions a bond issue of $12,500,000 has been issued for the widening of city streets.

The traffic requirements of the United States are such that the immediate widening of roads in and about the large cities is not only economically sound, but essential to the welfare of the people, according to the American Road Builders' Association. It was stated that the cost of traffic delay in the cities is greater than the cost of widening, signalizing and otherwise improving the roads could possibly be.

THIS SLATE QUARRY MARKETS WASTE AT A WORTHWHILE PROFIT

By F. A. Westbrook

A SLATE quarry which can dispose of its waste product with profit instead of loss is certainly an ideal thing to have. Nowadays this is possible, as there is a good market for granular slate, but it also requires a considerable investment for machinery and other equipment. The Sheldon Slate Products Company, Granville, New York, has a very complete equipment of this kind at its red slate quarry at Middle Granville. In fact, this whole operation is unusually well equipped and organized, and furthermore, it is in charge of a very progressive superintendent who tries experiments with intelligence, and apparently is backed by an equally progressive management.

Counterbalance for Wire Rope Controlling Car to Slate Mill

Quarry Operations

At one end of the quarry is the crushing plant. Three flat cableways terminate at this point on the same derrick stick and fan out over different parts of the quarry, extending clear across the quarry. Each cableway has its own hoisting engine, two being Flory and the other a Lidgerwood. As a general thing only two of these are operated at a time, which is sufficient for a production of 125 tons of granular slate per day. The third cableway is kept as a spare so that each unit may be taken out of service in rotation for maintenance purposes. Also by this method, in case of a breakdown, there

Trough Down Which Dust Collected from the Crushing and Screening Operations is Washed

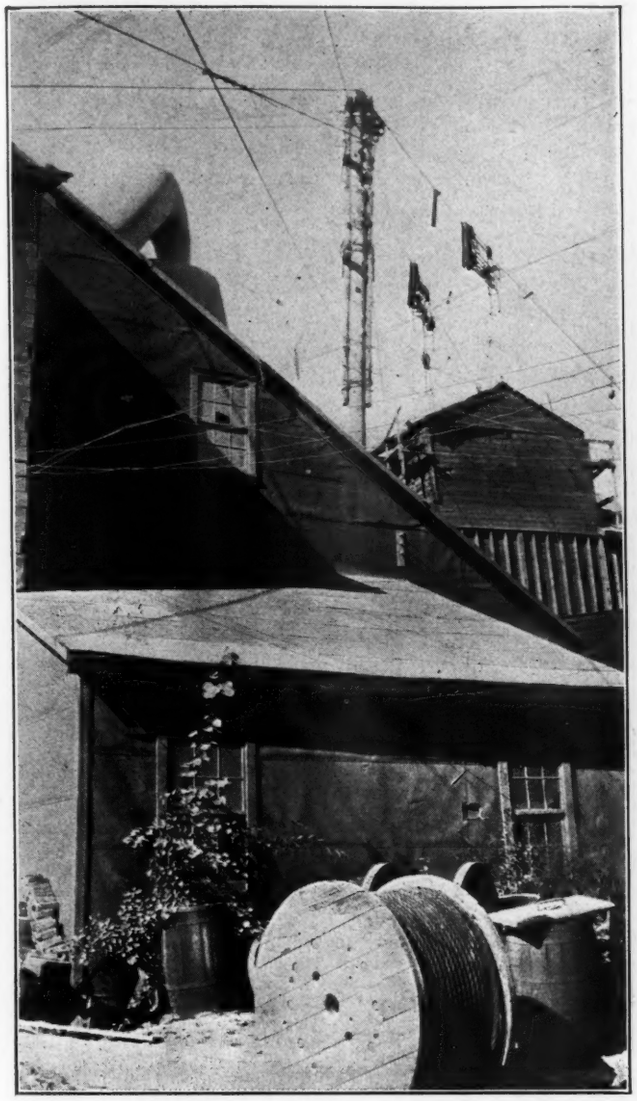
View of Quarry Showing 45 Degree Slope of Slate with Roofing Slate Bed at Right

will not be any interruption in the production of the crushing plant. The spare cableway is also put on regular duty when business warrants. The houses in which the hoisting machinery is located are so situated that the engineers can see both the bottom of the pit and the entire length of the cableways.

A fourth cableway runs the full length of the quarry and is used for handling roofing slate. This fourth cableway is so placed that it can deposit blocks of slate, suitable for roofing, on a car which travels on tracks entering the building where the slates are produced. An interesting detail of this arrangement is that the waste from the slate mill is loaded on a skip, taken out on this same car, picked up by one of the cableways serving the crushing plant and dumped into the rock bins. The Flory hoisting engine for this cableway has a special double drum for the track cable, by which the car is run back and forth to the slate mill, thus utilizing the principle of an endless rope. However, there is a slight difference in rope speeds on the winding and unwinding drums, due to the unequal number of turns of cable on each, and in order to take up the slack a counter weight has been devised as shown in one of the illustrations. Hazard wire rope is used for the cables.

For the actual quarrying operations there are two Sullivan and three Ingersoll-Rand jack hammers. The rock, as will be seen in the illustration of the quarry, lies at an angle of about 45 degrees, so that it is not difficult to take it out in benches. Two to three thousand tons are loosened at a time for the crushing plant. To do this, drill holes are made about ten feet back from the face, five feet apart and twelve to fourteen feet deep. Thirty per cent low freezing Hercules and Atlas dynamite is used. All waste rock from the roofing slate bed is sent direct to the crusher.

General View of Crushing Plant with Roofing Slate Storage and Tracks



Derrick Stick at Rock Bins of Crushing Plant from which Three Cableways Fan out to Quarry

Tracks from Hoisting House to Slate Mill

Compressed air for drilling is supplied by an old Sullivan machine, which was formerly steam driven. The steam cylinder has been removed and a motor installed in its stead. This machine has given a great many years of excellent service.

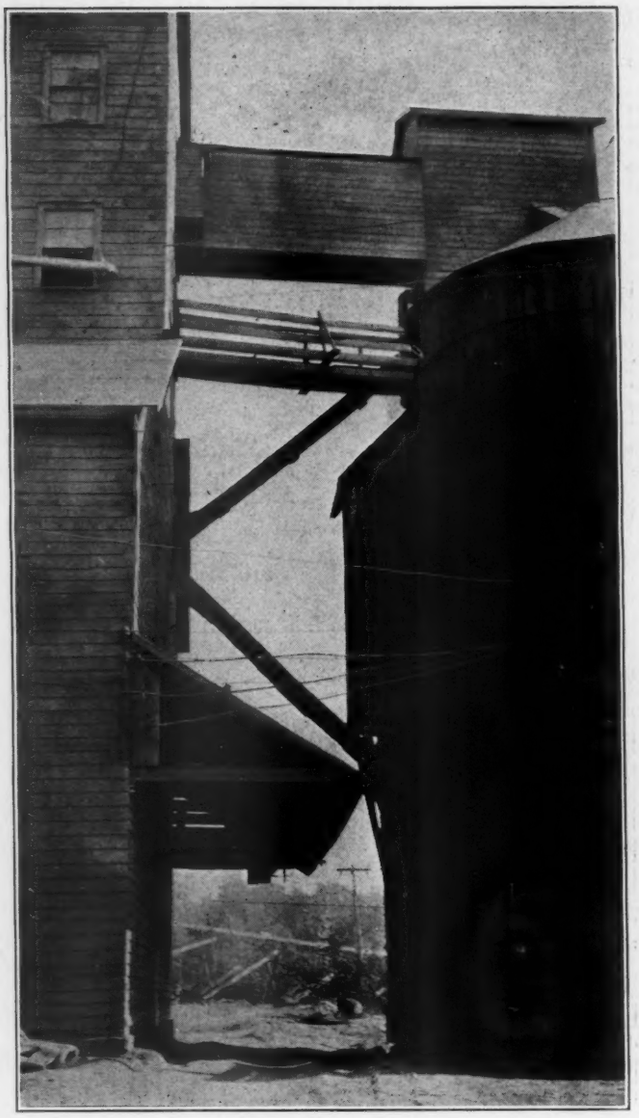
It may be of interest to note that Washington County, in which this operation is located, is the only place in the world where red roofing slate has been found in quantities of commercial value, and that this quarry has the largest exposed bed in the county.

Roofing Slate Mill

As will be seen from one of the illustrations, the hoisting engine house for the cableway used for bringing blocks of slate, suitable for roofing, up from the quarry is located close to the tracks leading to the slate mill. This has been done so that the engineer can spot the car, load it with quarry blocks and unload it of waste from the mill. The house has been carefully placed so that the engineer can see the pit and everything under the cable, thus making a motion boy unnecessary. It is also placed so that the engineer can see into the slate mill. In other words, by properly locating the hoister, it is possible for the engineer to perform a maximum amount of work with the least effort and to handle the machinery under his charge with maximum safety and minimum delay. It is a nice detail of management, worked out with great success because it eliminates delays and all unnecessary labor.

The track leading into the slate mill was not the easiest thing to build as it meant bridging an old quarry, but it was successfully accomplished by means of a queen rod truss bridge 90 feet long with two 45 foot spans.

When a loaded car enters the slate mill, the block of slate is unloaded by means of a Chisholm and Moore three-ton traveling crane with floor control. The block is placed on a Patch machine which saws it into the desired widths. The cutting is done by means of steel shot, and nine cuts are made simultaneously. This machine is capable of cutting enough red slate for a production of eighteen squares of roofing slate per day. This method of cutting is still in an experimental stage and is a cooperative effort made by the Sheldon



Storage Silos at Crushing Plant

Storage Silo at Middle Granville Railroad Station

Slate Products Company and the Patch Company. The machine works well and there is every prospect that it marks a decided advance in the slate industry.

After the blocks have been cut to the desired width, the pieces are split by hand. They are then trimmed by power driven machines, made by the Gray Foundry Company. The waste drops on a belt conveyor and is picked up by an elevator which deposits it in a bin located over the track coming from the outside cableway. Thus it is an easy matter to load a skip, placed on the small car, from a chute under the bin.

One of the illustrations shows Mr. Doll, the superintendent, drilling a roofing slate. This red slate is very hard, but after some experimenting Mr. Doll found that a rapidly vibrating granite tool would cut the nail holes in a very satisfactory manner. It is only necessary to clamp the tool in a frame and press the slate against it by a foot pedal.

The slates are loaded on a push car which runs on tracks extending from the mill to the storage yard. Here they are stacked according to sizes. Deliveries on order are made by a G M C truck which carries them to the railroad, a distance of about one-half mile. This truck is capable of carrying eighteen squares on one load.

Operations in Slate Mill

As previously stated, the production of slate granules is about 125 tons per day. Rock from the quarry is carried in Gray Foundry and Fair Haven Foundry and Machine Company skips and dumped into wood rock bins, large enough to hold two days' supply for the mill. The pieces of slate are fed by gravity through steel bars to a number 4 Kennedy gyratory crusher. A man is stationed at this point to guide the pieces into the crusher. From this primary crusher the rock is raised by a Sturtevant elevator to a Good Roads Machinery Company, Trommel scalping screen. The oversize from this screen drop back by gravity to the rock bins. The throughs are divided into half-inch and two-inch sizes by the screen and drop into separate bins.

The half-inch size is fed by gravity to two Sturtevant Newago finishing screens. The two-inch

Tracks Entering Slate Mill

size is fed by gravity to a 36 by 16 inch Sturtevant roll crusher. From this crusher the material is elevated by a Sturtevant elevator to another Trommel screen with half-inch openings. The throughs drop through chutes to the two Newago finishing screens already mentioned and the tailings to a 30 by 16 inch Sturtevant roll crusher. From the latter crusher the material goes to a single Newago finishing screen.

The tailings from all the Newago screens drop through chutes to two 30 by 16 inch Sturtevant roll crushers and are then elevated to two other Newago screens. From these screens the crushed slate is spouted on an elevator which discharges into two home made hexagonal revolving redusting screens. The commercial granular slate then drops by gravity into two inner storage bins holding 500 tons each. When these bins are filled, the overflow goes through a chute into an elevator which discharges into 1,000 ton storage silos.

The throughs from all of the double surface Newago screens are spouted by gravity to a single elevator which discharges into the redusting screens and thence to the storage bins. Only one size is made. The dust from all these operations is collected at a central point and elevated by a Sturtevant elevator to a Good Roads Machinery Company belt conveyor 12 inches wide and 170 feet centers. A stream of water washes the dust at the end of this conveyor down a trough to a waste area.

There are two sources of water supply, one nearby which is good for nine months of the year and the other nearly half a mile away which is used during the dry summer months. A Cameron centrifugal pump is used for one supply and a Gould centrifugal for the other.

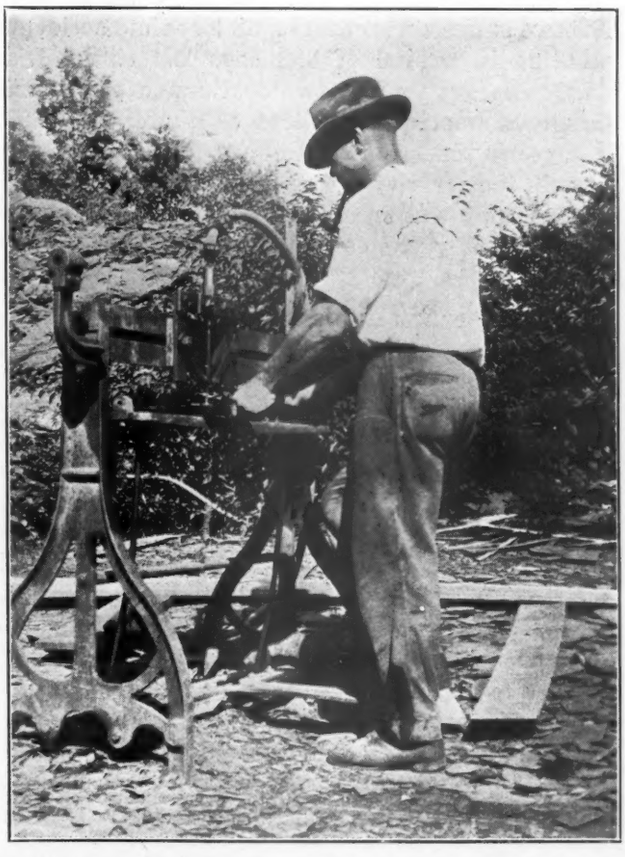
With all the operations carried on in this mill the mechanical handling has been so well applied and operates with such certainty that only three men are required.

Shipping Granular Slate

The shipping arrangements are in some respects peculiar and in others interesting. A six-ton Packard truck is loaded from the storage silos through

Truck Loading Roofing Slate at Storage Yard

a spout and is used to carry the material to the railroad. The body of the truck has two spouts in the bottom through which the load may be discharged in a minute and a half. The Packard truck is simply driven over the hopper and discharges its load. This truck has a record of transporting 175 tons from the mill to the railroad, a distance of ½ mile partly over a poor road, in nine hours. At the railroad station at Middle Granville the company has a storage silo for loading freight cars. The granular slate is picked up by a Sturtevant elevator and deposited in the storage silos or it may be deposited directly in freight cars. To load from the silo into a freight car, the material after passing through automatic recording scales is spouted on a portable belt conveyor which sets in the cars and directs the flow of material as desired.



Mr. Doll Punching Nail Holes in Roofing Slate

A YEAR WITH A BORROWED PLAN

By Edward H. Parry, Glenn Falls Portland Cement Company*

Mr. Parry considers the accident prevention program in effect at the Glens Falls Portland Cement Company a borrowed plan because it is based upon ideas gathered by Mr. Parry during discussions with H. G. Jacobsen, formerly manager, Bureau of Accident Prevention and Insurance, Portland Cement Association, William Sass of the Universal Portland Cement Company, T. F. Halpin of the Marquette Cement Manufacturing Company and L. M. McDonald of the Canada Cement Company.
—*Editor.*

THE plant of the Glens Falls Portland is somewhat out of the line of travel and receives few visitors, so a brief description of the plant will not be out of place. We have a million and a half barrel plant that during the past three years has gone through a complete reconstruction and is now modern in every respect. We operate our own quarry situated about a quarter mile from the plant. Our entire force is about 350 men made up largely of Italian and French-Canadian labor. The plant is operated on a three shift basis throughout the year.

The story of our accident experience for the past year would be without point unless the result of a previous period is briefly considered and comparison made between the two. In the calendar year 1925 we suffered two deaths, 38 lost time accidents resulting in a total of 892 days lost time. Disability charges for our two deaths and permanent diabilities amounted to 15,999 or a total of 16,891. In a year's time we had dropped from fifty-fourth place in the severity rating to one hundred twelfth place. There was an excellent change for improvement and only a small chance to make a worse record.

Plainly the first thing to be done was a thorough examination to determine if possible what the reason for such a record might be. On the surface there was no apparent reason. A complete safety organization was in operation, bulletins were used, warnings were posted, first-aid treatments were compulsory and yet there were accidents with appalling frequency and severity. A careful analysis of all accident records gave very little help. All departments seemed to be uniformly bad, and it was not surprising that there was a feeling amounting almost to a conviction that the sacrifice of human life and limb was essential to the manufacture of cement. The only evident fact brought out by this analysis was that the human element was responsible for the great majority of the accidents. Machine accidents were very infrequent, and in that respect we were no different from other plants in the industry. Evidently the factor of interest was the factor that was lacking.

The month of October was spent in an analysis of all accident records, the month of November in organizing a foremen's committee to take hold of accident prevention, and the last month of the year in perfecting plans for an intensive campaign to begin the new year. In our first meeting together these foremen were accused of being responsible for more than 75 per cent of the accidents because of their failure to use the authority they had in the direction of accident prevention. That first meeting marks the beginning of our new program bases on the personal responsibility of each foreman for the safety of each man under his jurisdiction. With the cooperation of this committee we felt sure improvement was certain, and the results show we have had the whole-hearted support of each member. We made no mistake in placing our goal too high. We knew perfection was not possible in one year, so our aim was set on a good substantial improvement.

During these first three months of my "experience" very little actual safety work was done. It was a period of preparation for the year 1926. This period resulted in one death and eighteen lost time accidents, thereby holding up the tradition of the industry that the last three months of the year are more disastrous than any other period. It was a discouraging time for a new safety director.

We began this year with the following organization. The foremen made up our central safety committee which has supervision of every angle of safety work. It was felt necessary to place authority behind the movement and these foremen gave us the most natural means of doing so. Each foreman was made personally responsible for the safe conduct of his department, and safety was placed on an equal footing with production and efficient work. A mark against any one of these is a mark against the record of that foreman. This committee make their own inspections, pass on all recommendations of the safety director and act as an advisory body for the safety director. Every item of the safety work is reported to them and they are constantly in touch with affairs. I cannot too highly commend this committee for the help and support they have given me. Without this support I am perfectly confident that we could not have made the improvement we have.

The second committee is made up of representative workmen from each department and is essentially an instruction committee. Weekly meetings are held and all phases of safety work are taken up. Attendance is compulsory, a part of the men's

*Presented before the cement section of the National Safety Congress at Detroit, October 26, 1926.

work. The immediate good this committee does is a doubtful quantity, but each time the membership is changed each department has a man that has been instructed in accident prevention work and has had the safety idea thoroughly drilled into him. We rely on these men to help carry along the floating force that is continually changing.

Our plant is divided into fourteen departments that follows as closely as possible the natural divisions of labor. A safety competition is run between these departments for periods of three months. At the end of each three months we wipe the slate clean and start fresh again. A cash award is given each man in a department that has completed the period without accidents causing loss of time. This competition began on January 1, and on April 1 we were able to reward nine of the fourteen departments. Five were eliminated by accidents that should not have caused loss of time. The old idea of taking a vacation for each slight accident was working. No effort was made by the personnel department to hurry these men back. In most instances when these men came back their welcome was not a cordial one. They had caused their department to lose out in the competition. One man, I recall, lasted one day and quit, another two days and a third less than two weeks. Ever since that first period a man is back on the job the morning following an accident unless there is a doubt of his disability. Vacations are not taken that way any more. I believe that is the most valuable lesson the safety department has taught. It has effectively cut out one of the causes of our consistently poor record and is naturally reflected in our severity rating. At the present time we find our lost time accidents are serious enough to cause loss of time, and we have made our problems one step less complicated.

This first period of our competition showed up one failure of the idea. A department losing out in the beginning of a period would lose interest until the second one started. It was not thought advisable to shorten the periods, so this defect was let go. It was really a mechanical defect that could be met by close personal supervision on the part of the foreman. The second period of this competition was a complete success. There were no lost time accidents during this period and we are able to run 107 consecutive days without loss of time. Our best previous record had been 42 days. Our greatest pleasure at this record was that we had practically rid the plant of the idea that accidents were essential to the manufacture of cement. That was a victory in itself.

During the third period there was a decided reaction apparently without cause unless it was due to the intensity of the work through the whole plant at the height of the shipping season. This third period spoiled our good record with four lost time accidents. This third period also marked the end of my year's experience on October 1.

For purposes of comparison I propose to take the periods January 1 to October 1 of the years 1925 and 1926. The following figures cover these periods.

	1925	1926	Reduction
Fatalities	1	0	100 %
L-T Accidents ..	29	16	44.8%
Days Lost Time .	6,437	386	94 %

As I have mentioned before the last three months of 1925 resulted in 1 fatality and 18 lost time accidents. The first nine months of 1926 we show improvements of 100 per cent, 44.8 per cent and 94 per cent over the same period of 1925. Without undue optimism I believe we will be able to increase these percentages of reduction by the results of the last period of our competition. We have our men fairly well imbued with the essential idea of safety and that is "no chance taking." Our paramount idea has been that the management does not expect or want any man to take any chance of injury. We expect to take care of the machine hazard and we expect every man to watch his own step.

From the humanitarian point of view, our experience has been successful. We may say we have prevented one fatality and a considerable amount of serious and painful injuries. Any corporation in these advanced times would gladly spend any reasonable amount to prevent a fatal accident, but these advanced times also provide us with compensation laws that are expensive and it is perfectly possible to justify an intensive safety campaign from the financial viewpoint. New York State is probably the most liberal of any in its provisions for injured employees. In certain cases the maximum benefits for a fatality may reach $25,000. No other state can attain this mark at the present time. Compensation is based on two-thirds of a man's average weekly wage with a maximum rate of $20 a week. Payment is not made for the first week unless disability should extend seven weeks. The cost of our compensation insurance for the first six months of 1925 amounted to approximately $13,590.49, for the same period of 1926 approximately $1,748.83, or a saving of $11,841.66. I regret that I was not able to obtain cost figures for nine months of 1926, but the Actuarial Department of the State Insurance Fund is undergoing a reorganization and I have had to content myself with the figures for six months. The cost of our competition was $2,770 and that amount covers the increased cost of the safety departments in 1926 over 1925. Adding these figures to the incurred medical and compensation cost for 1926 we can show a saving of $9,071.66. We justify our giving a cash bonus for safety by the fact that we are taking it from our insurance fund and giving it to the men. It should not be necessary to purchase a man's safety, but there is nothing that

appeals to the average working man as an increase in his pay envelopes. We were anxious to get immediate results and took this means to stir up interest.

I do not want to convey the impression that the officials of my company base the success or failure of accident prevention work on any profit or loss result. My job was to cut down accidents and it was certainly a pleasure to justify that work from the financial viewpoint without resort to the plea of humanitarian feelings. Every safety director has a possible out on that plea, for no one can measure the value of human life in terms of the cold dollars of our business world.

So much for the accident experience of my plant during the past year. It has been a year of work with the reward of results obtained. As representative of my company, I am anxious to know how many plants can show greater percentages of improvement than we have. Our committee is quite proud of these figures, but it does want to know how we stand in comparison with other plants. We are not yet able to compete with the leaders, but we expect to be there in time. We are trying to build a solid foundation so our superstructure will stand the test of time. Our leaders in the industry have made a long ladder for us to climb, but we are working on the assumption that the only thing a record is good for is to be broken. If in this calendar year we climb up a few rounds in the association records we will consider that a recompense for our work and an incentive for further improvement.

Finishing Lime Association Organized

During the past few years there has been a feeling on the part of those manufacturers of lime whose plants are located in Northwestern Ohio, that there was a need of active cooperation and the formation of an Association, and this thought has finally crystallized in the past month by the formation of The Finishing Lime Association of Ohio, with headquarters at 508-9 Home Bank Building, Toledo, Ohio.

This is a significant move in the history of the lime industry, as it is the first time that any differentiation has been made in the different kinds of lime, and with the production of the Ohio manufacturers attaining a national distribution of the finishing hydrate in the past year, it is self-evident that an organization of some kind is necessary. The organization was formed primarily to render a national service to architects and dealers for the purpose of extending and improving the uses of finishing lime in construction. With the centralization of the finishing lime industry to the small area, and with the manufacturers having all of their interests in common, it is also the intent to have the Association handle traffic matters and other business in which they have a common interest.

The finishing lime stone deposits embrace a small area of Northwestern Ohio. It is significant that for years manufacturers of lime in other localities have been trying to develop and produce a finishing hydrate without success. It is for this reason that the finishing hydrates of Ohio have a national distribution. The plants of the members of the Association represent the last word in lime plant construction, and in quarry operation. The rock from which the lime is burned is selected carefully as to size and quality, and the resulting lime is again inspected and only the cleanest and purest pieces of lump lime is used in manufacturing the hydrates.

It is the purpose and intent of the Association to maintain a constant uniform quality and investigate and recommend only the standard and correct practices in its use. Field work is to be carried on through a corps of engineers in the field, who will call on the dealers, contractors, and architects, as a means of getting a more complete understanding of the merchandising and use of the finishing hydrate. Research work will be carried on to a limited extent, investigating the advantages of the finishing lime for new uses and in the construction field.

Literature of a technical and semi-technical nature will be prepared and distributed with the aim of bringing the user and the dealer into more personal contact, and better understanding on the marketing problems of lime.

All of the Distribution Members of the Finishing Lime Association operate under the 100 per cent dealers plan, and the membership consists of:

Kelley Island Lime & Transport Co., Cleveland, Ohio; Luckey Lime & Supply Co., Luckey, Ohio; National Lime & Stone Co., Carey, Ohio; National Mortar & Supply Co., Pittsburgh, Pa.; Ohio Hydrate & Supply Co., Woodville, Ohio; Woodville Lime Products Co., Toledo, Ohio.

The officers of the Association are: Fred Witmer, president; E. C. Swessinger, vice-president; G. H. Faist, treasurer, and L. E. Johnson, secretary and general manager.

Tremendous Car Loadings Continue

An unprecedented freight traffic continues to be handled by the railroads of this country. Loading of revenue freight for the week ended October 23 totaled 1,209,043 cars, according to reports filed today by the carriers with the car service division of the American Railway association.

This was a decrease of only 1,130 cars under the preceding record week this year when 1,210,163 cars were loaded, the greatest number for any one week ever reported.

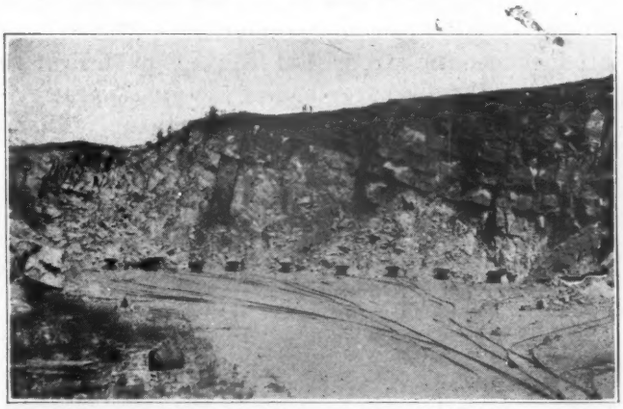
The total for the week of October 23 was an increase of 86,366 cars over the corresponding week last year and an increase of 95,990 over the corresponding week in 1924. Loading of revenue freight has been in excess of one million cars in twenty-two weeks so far this year.

RECENT IMPROVEMENTS BROADEN THE MARKET FOR WHITEROCK QUARRIES

WHITEROCK QUARRIES was incorporated in 1905 under the laws of Pennsylvania and reorganized in 1913 with an increased capitalization and a very much enlarged plant and organization. The business of this company has grown very rapidly. Only one form of lime was marketed until 1925, however, namely, high calcium lump lime. This high calcium lump lime for all manufacturing, building and agricultural purposes made the reputation of the Whiterock Quarries. Both the quality and the color are widely known. The stone analyzes 99.009 per cent carbonate of lime, 0.341 per cent carbonate of magnesia, 0.220 per cent oxide of iron and alumina and 0.430 per cent insoluble.

In 1925 the company decided to market hydrated lime and ground and pebble lime. A new Kritzer hydrating plant, a ground lime and a pebble lime plant were built in 1925. Additions and improvements were also made in the crushing plant at that time to increase the capacity so that 30 carloads of limestone could be produced daily. Most of the limestone produced is sold for blast furnace purposes although there is large volume sold for open hearth stone, commercial and highway uses.

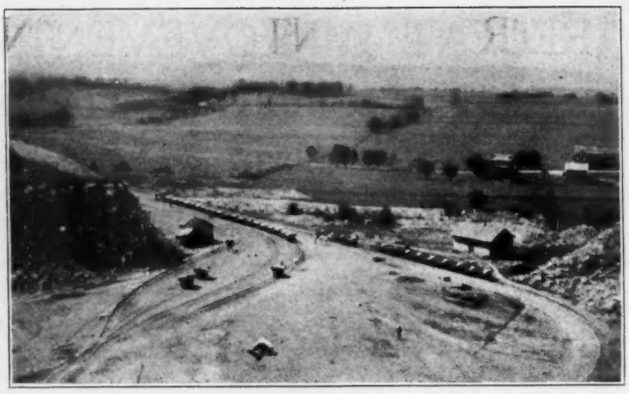
In August of this year a new pulverizing plant was built adjoining the crushing plant. Two pulverizer units have been installed, a new Williams Universal pulverizer and a Stroud pulverizer. The Stroud pulverizer is of the beater type with air flotation and is only used for fine grinding such products as asphalt filler and finely pulverized limestone for mine dusting. This Stroud pulverizer is operated by a 40 h.p. motor. The machine has a capacity of from one to two and one-half tons per hour depending upon the size feed which ranges from 20 mesh at times to as large as 2 inches. The Williams mill is a number 3 machine of the hammer type and is capable of pulverizing from 8 to 22 tons per hour depending upon the size of the feed as well as on the size of the finished product. This machine will take a feed as large as 3 inches. A 75 h p. motor drives the Williams mill.



View of Number 5 Quarry

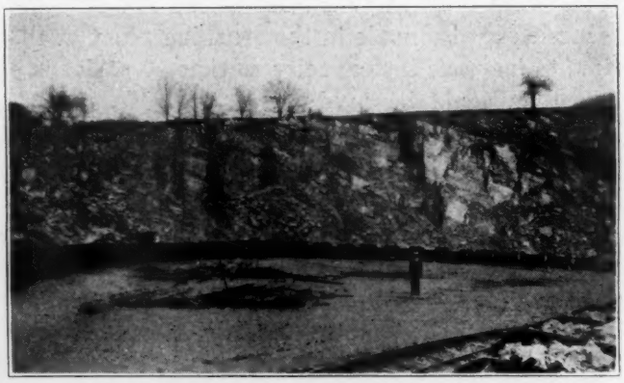
Well Drill Shot Removing 45,000 Tons Stone. Quarry Face 110 Feet High

Loading Well Drill Shot, Top of Number 3 Quarry



View of Quarry Entrance and Whiterock Farms in Background

The pulverizing plant draws its supply from the crusher bins for small size stone. The material is passed from the crusher bins through steel chutes which discharge into one feeding hopper which delivers the material to a 38 foot elevator. The material is elevated to a 50 ton bin which feeds the two pulverizers previously described. The finished product coming from the Stroud pulverizer is bagged at the discharge end of the air separator in open mouth bags. The product from the Williams pulverizer is discharged into a bucket elevator which elevates the material 35 feet and discharges it onto a belt conveyor set at an angle of 30 degrees with the horizontal. This belt conveyor carries the material to a tandem Hummer vibrating screen 60 feet above the tracks where it is properly graded. This Hummer is a two wire screen and produces three different sizes which are discharged directly into three bins underneath the screen. The addition of this new pulverizing plant enables the Whiterock Quarries to produce any size stone from 6 mesh to 300 mesh.



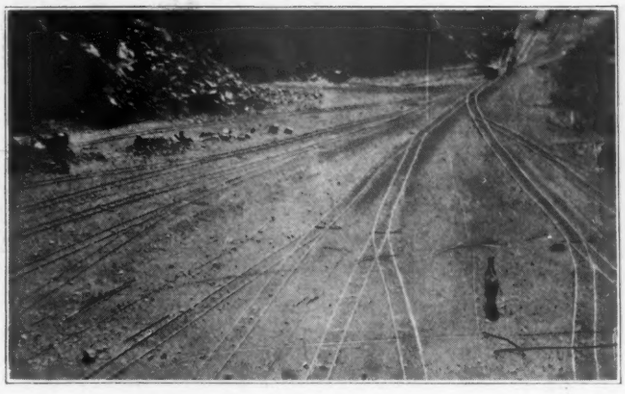
Quarry View of Whiterock

The bottom of the pulverized limestone bins are 10 feet above the level of the box car. This height is sufficient so that bulk material can be loaded by gravity to a box car loader placed in a box car. The middle bin holds material to be sacked. This

Blast Furnace Limestone

Drilling Crew With Piston Air Drill. Top Number 5 Quarry

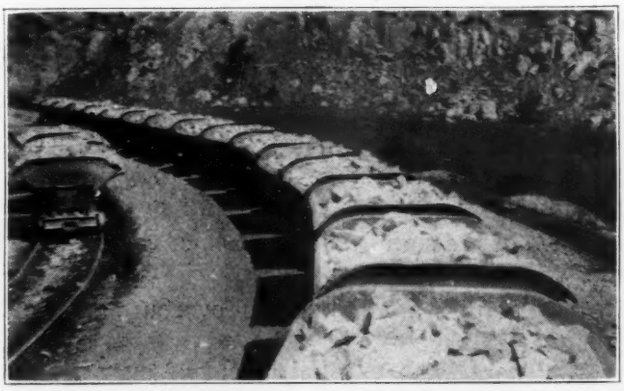
View Looking East at Number 6 Quarry



Entrance to Number 5 Quarry

packed material is handled by a two tube Bates valve packer which is capable of packing 8 tons an hour of fine material.

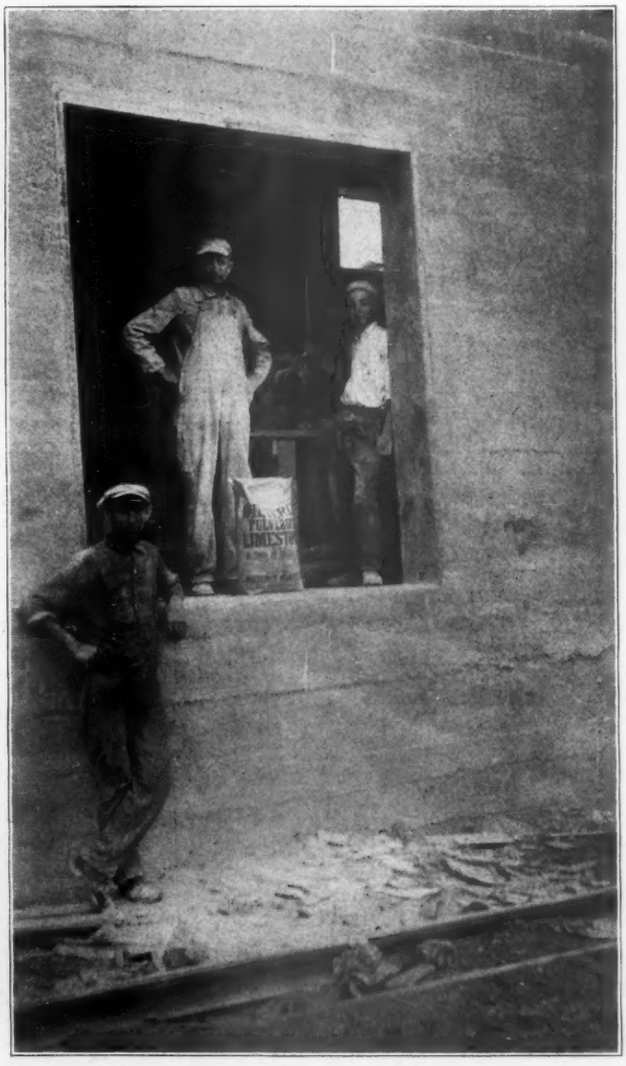
The product of this pulverizing plant is being sold at the present time for asphalt filler, mine dust, agricultural uses and for use in glass works. The pulverizing plant is being operated on a 24 hour basis.



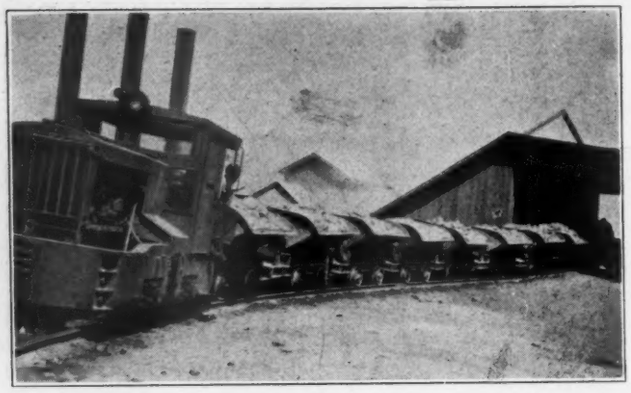
Open Hearth Limestone, Ready to be Loaded for Shipment

The drilling in the quarry is handled by Ingersoll-Rand and Sullivan air drills. Twelve of these drills are in use. Air is furnished by an Ingersoll-Rand air compressor. The bench method of quarrying is standard practice. The stone is all loaded by hand into Koppel and Lakewood all steel rocker type quarry cars of two and two and one-half yard capacity. About 250 of these cars are in use at the present time. Some of the illustrations give a fair idea of the length of some of these trains. There are about nine miles of railroad track on the property including both narrow and standard gauge track. On the standard track 80 and 100 pound steel rails are used, while 40 and 70 pound steel rails are used on the narrow gauge track. The longest haul from the quarry to the mill is one and a half miles. Plymouth gasoline locomotives are used for hauling the quarry cars to the mill. A

Another View of Quarry



Bagger at Pulverizing Plant

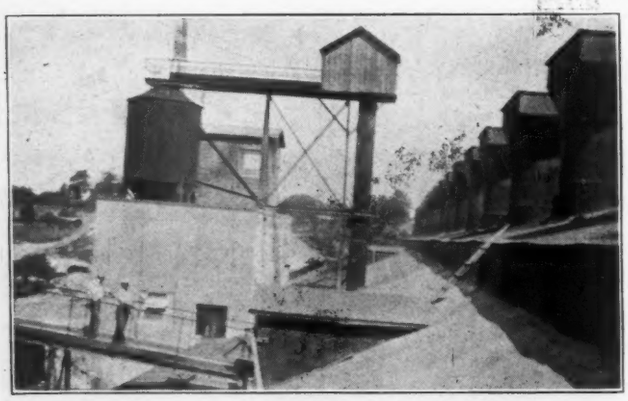


View of Train at Crusher

Partial View of Battery of 18 Kilns

Brookville gasoline locomotive is used in the quarry also for moving cars.

The crushing plant consists of an Allis-Chalmers gyratory crusher and screens. A Chandler and Taylor steam engine furnishes the power for the crushing plant and the Ingersoll-Rand compressors. Erie boilers are used in the power house to generate steam. There are 18 kilns of the vertical type each 5½ by 30 feet. Each kiln produces on an average 8 tons of lime per day. Coal and wood are



Hydrating Plant and Kilns

used for burning. The mill units are all electrically equipped. Power is purchased from a local company.

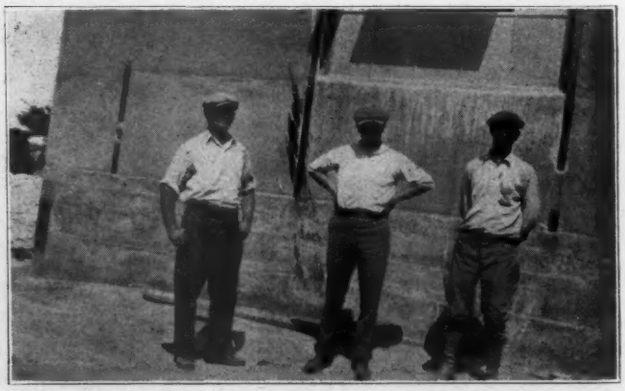
An excellently equipped machine shop and a car repair shop are maintained. All repair work is done at the plant. Four trucks are used in and around the plant for miscellaneous hauling problems.

The lump lime and pebble lime are shipped in bulk and also in Pittsburgh steel drums. Prices to the consumer are quoted in bulk, in steel barrels, in Bemis Calsax and in 50 pound bags. Pebble lime is shipped generally in the Bemis waterproof bags.

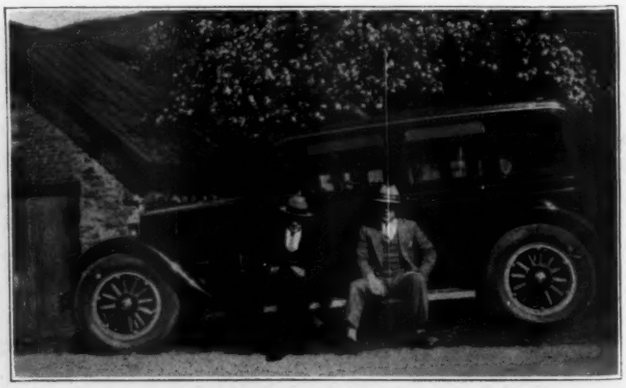
A water line for fire protection purposes has been installed. Fire hydrants as specified by the Underwriters Association have been installed. The water is secured from the Pleasant Gap Water Supply Company. The total operating force includes about 250 which is somewhat larger than would be expected because the stone in the quarry is loaded by hand.

Some of the significant features of the plant and the Whiterock Quarries are:

1. There is a minimum of overburden in the quarry.
2. There is an unusual layout of quarry track including both narrow and standard gauge.
3. The stone has about as white a color as any limestone in the country.
4. The plant is not a pretentious affair but offers evidence of the fact that expansion has come gradually and has been made to fit in with the other units.
5. All sizes of product from 6 mesh to 300 mesh can be produced.
6. A real pebble lime is being produced.



Left to Right: Fred Crofts, Lime Foreman, Chas. E. Stearns, Plant Supt., Wilbur Sodion, Master Mechanic



Left to Right: Charles B. Stearns, Supt., Ray C. Noll, Gen. Mgr.

7. A sound conservative business policy has dictated that plant extensions and new units be installed after a thorough investigation reveals a stable market for either new products or a larger production.

8. All forms of lime are produced.

The officers of the Whiterock Quarries are: W. Fred Reynolds, president; A. Fauble, vice-president; Ray C. Noll, treasurer, and L. A. Schaeffer, secretary. Ray C. Noll is also general manager. S. Blaine Mabus is now purchasing agent and traffic manager after having been plant superintendent for seven years. C. E. Stearns, the new superintendent, is a graduate mining engineer. The offices of the company are located at Bellefonte, while the plant is located at Pleasant Gap.

Arsenic Production in 1925

Only by-product arsenic plants belonging to three smelting companies and one mining company were producing white arsenic in the United States during 1925, according to the Bureau of Mines, Department of Commerce. These plants are situated at Tacoma, Wash., Globe, Colo., Perth Amboy, N. J., Midvale, Utah, and Anaconda and Jardine, Mont. At the Jardine plant, which is connected with amalgamation and cyanidation works, arsenic is recovered as a by-product in the treatment of arsenical gold ores. All of these plants were built or were enlarged in 1923 when the demand for arsenic was the greatest, and no increase in the total quantity of ore treated was necessary to enable the imported and domestic supply to fill consumers' demands in the United States. About half of the arsenic produced came from the smelting of lead ores, the other half from copper smelting plants and from the Jardine gold mill. The chief sources of domestic arsenic were Utah and Montana, where it was recovered from miscellaneous ores and concentrated by the American Smelting & Refining Co., the United States Smelting, Refining & Mining Co. (Inc.), the Anaconda Copper Mining Co., and the Jardine Mining Co.

The only companies which produced ore that was sold in 1925 for its arsenic content were the Western Utah Copper Co. and the United States Smelting, Refining and Mining Co., at Gold Hill, Utah. This ore, little of which was mined in 1925, was shipped to the smelters and stock piled for future treatment. The output of arsenical ore of the Gold Hill mines decreased from 35,444 tons in 1924 to 3,045 tons in 1925. The Western Utah Copper Co. also shipped monthly an average of about 1,000 tons of lead-silver ore containing a little arsenic and considerable iron to the lead furnaces at Murray, Utah. Experimental work in the manufacture of weed killer and Paris green from fume recovered from a 2-ton roasting plant at Sapinero, Colo., was reported by the White Iron Ores & Products Co.

Interesting Safety Work Conducted By Atlas Portland Cement Company

Alex Morrow presented an interesting picture of the safety activities of the Atlas Portland Cement Company in "Labor and Industry" for October.

"One of the reasons for the success of the safety activities of the Atlas Portland Cement Company is that everybody in charge of quarry work realizes the hazards which exist and considers quarry occupations as among the most hazardous in which men engage. This health atmosphere has enabled the management to put across its safety campaign without first having to instruct those in supervisory positions as to the necessity of the workmen in their charge being ever alert and watchful to their own safety and that of their fellow workmen.

"Every man employed is given a lengthy talk on the hazards of the work together with the results accruing therefrom. A book of rules and regulations in various languages concerning employe's conduct is given to each man. In this manner "Safety" is made paramount in their minds. All men employed in the quarry are carefully looked over to determine their adaptability for the work for which they are employed. If they are found to be lacking, their work is changed until an occupation is located compatible with their adaptibility. Should the man be found to be so lacking that he is not adaptable for any class of work, he is discharged. In this manner a prospective employe's safety as well as the safety of others employed, is protected. If a man is found suitable for the job for which he has been hired, he is instructed regarding the nature of the employment, use of the tools, and the relation of his employment to the other employes. He is further, instructed as to the general operation of the quarry warnings and shelter.

"The quarry is provided with portable shelter houses of heavy oak construction to insure proper distance from flying objects, when needed. A large 'Mocking Bird' whistle has been provided as an alarm for blasting, and when blown all men seek shelter and remain under shelter until officially notified that their exit therefrom is safe. Safety belts and life lines are provided for those employed on the quarry top, and those working the bank. Goggles are also provided where necessary.

"In making large blasts of deep well holes only fully experienced men, under the supervision of the chief blaster are employed. After the blast has taken place all loose rock is removed before any workman is permitted on the bank. All dynamite for use in the quarry during the day's operation is under lock and key. That, remaining after the day's operation is removed to the magazine before the operations for the day cease.

(Continued from page 66)

Souder, the vice chairman, deserve the appreciation of the crushed stone industry for the work they have carried on for the past two or three years in developing interest in safety and accident prevention in the crushed stone industry which has resulted in the quarry section becoming one of the most active and profitable of the National Safety Council.

A. T. Goldbeck, director, bureau of engineering, National Crushed Stone Association, presented a paper entitled "Financial Aspects of the Safety Movement in the Crushed Stone Industry." The financial benefits resulting from the adoption of safety programs were a surprise to many present. This angle of the problem will interest many who have not considered the profit side of safety work. The paper is published elsewhere in this issue.

W. F. Smith, safety department, Ford Motor Company, offered some practical suggestions in his paper on "Safety Education." This paper is also presented elsewhere in this issue. Mr. Smith answered many questions as to the effect upon the workman of the measures he advocated.

F. F. McLaughlin, France Stone Company, has a remarkable safety reputation and his paper on "Handling Explosives" was full of suggestions which he actually uses in practice in his work of directing the blasting operations of his company. There is probably no single individual in the crushed stone industry that has as much to do with the actual problem of explosives as Mr. McLaughlin. The value of the human life is of real importance to Mr. McLaughlin and you are urged to read his paper which is presented elsewhere in this number.

Mr. E. E. Evans, after appointing the nominating committee, asked them to excuse him from any consideration as the chairman for next year as he believed a new chairman should take up the work. Mr. Evans had given part of his time for two years and worked up an active interest in the crushed stone industry which could be continued by others. Pit and Quarry takes this opportunity to say that Mr. Evans has accomplished a huge task and has developed a real movement which the entire crushed stone industry can profitably support. L. R. Cartwright of the Midwest Crushed Stone Company was elected chairman for next year. Don C. Souder of the France Stone Company, was re-elected vice chairman. A. C. Hewitt of the American Lime and Stone Company was elected secretary.

The sessions referred to were all well attended and the programs were of genuine interest. The discussions were an illustration of the interest on the part of those in attendance. The sessions next year should find a large attendance because of the value of accident prevention and safety work in the non-metallic mineral industries have been demonstrated.

Opinion From Leading Economists Concerning Business

This summary presents the general opinions of the several authorities on the prospects for business during the remainder of the year. It will be understood that such brief interpretations cannot include the direct advices or give the qualifications that sometimes accompanies the expression of opinion. We feel it is significant, however, that all the opinions should be so closely parallel. The essence of this digest is: "good business."

Brookmire: The prosperity of most rural sections should be reflected in a continued high volume of general trade. The balance between production and consumption should cause rather steady commodity prices.

Alexander Hamilton: A satisfactory volume of business should continue throughout the ensuing few months. No decided advance in commodity prices seems probable, so that retail trade should be seasonal.

Babson: A good volume of business not far from present levels should continue through the Fall. In "sales" the outlook for the next two or three months is "favorable" but conditions will be "spotty."

Bankers Economic: As an index to general business, carloadings continue to reach record levels. There appears no indication o fan immediate approach of tight money, but real estate bonds should be very carefully examined before purchase.

Harvard: General business is proceeding with a momentum which should carry it prosperously through the remaining months. Renewed expansion of manufacturing operations appear to be under way.

Gibson: Neither boom nor depression is in the offing for general business. There is little danger of over-production and the recession of commodity prices is so gradual as to have little effect on conditions.

Poors: Nothing has occurred to cause business to fall short of the expected degree of prosperity. Actual commercial business in "building construction" will continue in large volume throughout the next few months.

Moody: Trade is not booming, but rather advancing in an orderly manner. The normal seasonal increase in general business and industrial activity is taking place.

United Business Service: Business should continue good for some time, but gradual contraction is indicated. Although money is apparently plentiful, indebtedness has increased much faster than the volume of business. Opportunities for long term bond purchases should be better during the next two or three months.

HANDLING EXPLOSIVES

By F. F. McLaughlin, Blasting Engineer, France Stone Company*

NO SMOOTH, level, even working commercial industry of today found its way to such a state by "happen-so" methods or simply of its own accord, without direction. Ever since commercial and humanitarian statistics have proven the value and sense of human safety in dustrial programs, we find that by great leaps and bounds safety measures have entered as one among the major policies of industrial management throughout the business of the nation and world. Faith in the rightness of a thing has often been the only foundation on which great results were finally built. Many of our great industrial organizations of today had for their beginnings only men with faith in an idea. The growth and success of such enterprises have rested upon the perserverance, patience and toil required to justify those original faiths. Mental attitude can build nations or tear them down.

"Safety First" was just such a faith-provoking idea in its beginning. It has not reached its present status in the world of industry by any haphazard course best designated by the words, "chance" and "luck." We here today, meeting as a part of the Fifteenth Annual Safety Congress of the Allied Safety interests of our country, are but beneficiaries of all the faith, patience, perserverance, and toil it has taken to make such an expression of the spirit of "Safety First" possible.

Faith, after all is said and done, may be simply described as an attitude of certainty regarding a cherished object. In this sense, industrial safety must, first of all, become a personal attitude with us on our jobs before the practical operation of its sense and value can follow.

In many industries safety can be provided for workmen by mechanical means, but not so in this work of handling and using explosives. This is one of the many occasions in which the attitude of safety must predominate before safety can become a fact. It is possible that some are under the impression that to actually associate the idea of safety in connection with the handling of explosives is sufficient cause for a gentle snicker of derision. Perhaps you do not quite realize that today explosives are as indispensable as capital and labor in the development of the original source of all our industrial processes. Quite a number of the pages of this paper could be devoted to statistics showing you the diversified use, every year, of many million pounds of this concentrated energy, and those statistics would also show a surprisingly small toll of human wreckage compared to the supposed real hazard its use creates.

*Presented before the Quarry Section of the National Safety Congress at Detroit, October 28, 1926.

It is not so much the total number of accidents, however, that make us think of explosives as one of the necessary "bad actors" in the industrial world as it is the totality of devastation and horror created when its power is unsafely loosed. The ordinary commercial explosive such as we buy and use today, will do no more of its own accord than will a pile of sand. It doesn't go into unexplainable tantrums and produce an effect without a controllable cause. It can be generally said that all results, both good and bad, from the use of explosives are directly due to either human direction or misdirection of its true function. Knowing the terrific power explosives develop, the logical conclusion to the previous statement is this: a careful, informed man is far safer while using explosives than he is crossing a street heavy with traffic in one of our large cities; but an uninformed, careless man might just as well be playing on a railroad track ahead of a fast train, as with a case of dynamite, so far as his personal safety is concerned.

It is not a chemical explosive deficiency, but a human mental deficiency that is almost totally responsible for blasting accidents. True it is that an uncontrollable caprice of the elements will at times enter and destroy our well laid plans for safety in the use of explosives, but even such things as stray ground currents, storms, hot sparks, and lightning can be anticipated by the foresighted blaster, and guarded against. The greatest cause of blasting accidents is careless, ignorant men—ignorant, I mean, about the proper and safe use of explosives. This seems as simple as saying twice two is four, but if saying it ten thousand times right here and now would help to seat this fact firmer in your minds and by its guidance give you future relief from blasting accidents, it would be worth our time and interest to repeat it that many times together. In handling and using explosives the sensible way is the right way and the right way is the safe way. To be free from blasting accidents requires no miracle. It is only necessary to be sensible—and being sensible with explosives is comprised simply of knowing what to do and doing it.

Truths are facts and facts are details, not generalities. Safety with explosives is a matter of knowing the actual details of its nature. The first step in learning how to prevent blasting accidents is to learn how they have and will occur—and this step must deal with the explosive itself as well as the human factor involved in its use. Nitrated chemicals form the explosive base of most of the explosives in use today. Ordinary starch, ammonia

and glycerine are treated with acids in such a manner that the resulting chemical will produce a large volume of gas in an infinitismal space of time when given an initial detonating impulse. It is by confining for a short time the rapidly expanding gas from a detonated explosive that we make it do its intended work of fracturing or rupturing some material in which we have located it. These acid-treated chemicals are mixed with and are carried in a non-explosive base material to make them much safer to handle and use. Combustion, explosion, or detonation of an explosive can only occur from certain specific causes and under specific conditions.

High explosives will detonate of their own accord when heated to 200° centigrade. They will begin decomposition at a temperature as low as 60° centigrade. For this reason they should not be stored in a place excessively warm to your body nor located for blasting purposes in a hot bore hole. Neither should they be stored or used in a place excessively cold, unless made specifically low-freezing, because some explosives become rigid, congealed, or "frozen" under such conditions and are much more susceptible to explosion by friction when in such condition. As a rule when a paper cartridge wrapper shows a brown, oily stain, or when the cartridge is hard and rigid, or when it is wet and soggy, do not use it. Call in the manufacturer's representative and let him advise you.

Most explosives start burning easily and burn rapidly, partly due to the parafined paper wrapper in which it is packed, and partly to the inflamable nature of the chemical itself. A small spark will set it afire, and if the gases of such combustion cannot readily diffuse with free air, the increased temperature will lead to its explosion. Avoid sparks or any kind of fire from all sources during any part of your blasting operations. The steam shovel, locomotive, crane, hot carbon of gas engine, exhaust, pipes, matches from the men's pockets and dottle from their smokes, metal or imbedded rock on the tamping pole can all produce a fire hazard to the explosive. Take steps to prevent these from occurring.

High explosive under some conditions will explode or detonate from the friction of rough handling in or out of the box or bore hole. Mark this word "rough." High explosives will stand a lot of abuse when it is in a normal condition, but this fact offers us excuse for forming habits in using it that become potential accident makers when the condition of the explosive is not normal. Lightning will detonate explosives or any of the commercial detonators for explosives. If you have located explosives on a shot, in or out of the bore holes, and lightning approaches, avoid possible trouble by removing all your men to a good safe distance from it until the disturbance is well gone. Do not poke, or jar, or hammer an explosive roughly or heavily with any kind of a tool, wooden or otherwise, and do not tamp the explosive if you wish to be thoroughly safe. Tamp the stemming above the explosive if you will, but keep the tamping rod well away from the detonator or its connections. The detonator caps are even far more "sensitive" than the explosive, and their nature must be respected and treated in this light.

Avoid having any more men working on or about a shot than are absolutely necessary. The safety of all can be endangered by one. The more men the greater the chances for trouble and the more effected when trouble does hit. A fore-sighted manager can usually keep his blasting operations sufficiently ahead to make rush jobs unnecessary. I wish to repeat to you a suggestion made in our meeting in the convention of last year, that you give earnest consideration to the quite reasonable amount of safety provided in blasting operations by the use of a wooden peg and a rope with which to lower explosive cartridges in bore holes. Four things this practice assures: it prevents "hung" or lodged cartridges in the bore hole, and the subsequent possibility of trouble involved in dislodging them; it prevents rough treatment of the detonator and its connections; it prevents excessive friction on the explosive; it gives the blaster exact information regarding the location of every cartridge in the bore hole. To some this practice may seem to involve a considerable amount of extra work; but we have developed, with the cooperation of the explosive makers, the use of twenty-five pound cartidges of five-inch diameter, in both the pulp type and gelatin. Either of these will handle easily on a peg, and when you can thus load a case of explosives in two movements the labor argument against "pegging" is largely dissolved. Several explosive makers have indicated their willingness to cease packing explosives so snugly in a box as to make it necessary to knock off the lid, turn the case upside down, and dump the entire contents in order to gain the explosive from the case. It is a better way to have the explosive case of sufficiently greater length than the enclosed cartridges to make it easy for the men to open the lid of the case and lift the cartridges from the case, leaving the packing and the box to be removed entirely from the shot. Loose paper and sawdust are not good companions for the explosive around the bore hole.

The task of connecting the detonators or "hooking up" a shot requires special specific knowledge and should be committed to a very few good men who know what they are doing and how to do it, with ability to think before they act. This part of your blasting is better and more safely accomplished after all other workmen have left the shot. Electricity, invisible, and therefore dangerous to human life, when used with electric blasting caps to detonate explosives, should be used with the

exercise of every available precaution to prevent a premature blast. Power lines adjacent to a blast should be well insulated and located off the ground. Power lines with frayed insulation lying on wet ground can cause stray currents to enter detonator wires with the comparatively small amount of current it takes to fire one. Be sure that your mechanical methods of connecting current to the blast are in such a location, of such a type, and are used in such a manner that a premature blast is impossible; that the shot firer cannot be reached by flying fragments from the blast, or that no one can open or close the switch save one to whom is delegated that responsibility. Any of you men who have to pay compensation costs because this was not done know wherein the sense of it lies.

A blasting machine or "battery" often spends much of its time exposed to elements poor for its health. Knowing this many old blasters, preparatory to its use to fire a shot, will push the rack bar down three or four times to "pep" up the magneto in the generator. It is totally unnecessary to connect the leading wires from the shot to the blasting machine until the moment before firing the blast. Observe this precaution and avoid premature blasts that may occur if the blaster unconsciously "peps" the blasting machine with the lead wire tied to it. Misfired or unfired explosive charges in the midst of the mass of a made shot form one of the extremely hazardous results that can occur to a blast. After it is done there is no safe cure for it.

Prevention is the sensible course. Misfires are ordinarily caused by detonator failure or improper connections or improper use of current. The two last causes you can control. As for the first cause, I regret to say that there has not yet been made and sold a continuously one hundred per cent efficient detonator. So long as this is a fact we cannot have perfect freedom from misfired holes. There still remains this mark of attainment for detonator manufacturers to strive for. So long as there is an unfired cap located in an explosive charge, with the chance of anything hard striking the cap with force, there is a chance for a serious accident to occur. Explosives will sometimes detonate when loose in blasted material and struck with a shovel dipper. They will almost always detonate if an imbedded cap is discharged. Even explosives that have lain unexploded in a shot for some years do not always have their power dissipated to a point of safety. When cordeau is used as detonator, misfired charges can be caused by broken lines, wet or poorly made connections, the cordeau curved in too short an arc, and by ignoring the proper detonating sequence of rows in connecting multiple row shots. In laying out the ground or connecting line of cordeau distance should be considered that multiple row shots will fire from the face back. Countered cordeau only should be used in the holes because of its greater strain strength and resistance to the friction of loading explosives and stemming in the bore hole. It is a safer, simpler manner of detonating the holes than the practice of detonating the cordeau in each hole with a cap. It is unwise to depend on one cap to a hole. If the single cap happens to be faulty a misfired hole will be the usual result. Do not bend a short right angle in that short part of the cordeau that arises above the hole. Let it stand straight up and at right angles with the connecting line. Protect all cordeau connections from possible dampness.

Where electric blasting caps are used, misfired charges can be caused by the detonator wires having been broken or bared and shortened, due either to the method used of loading the explosives or tamping the hole. By testing each electric cap with a galvanometer before using it, and rejecting those that indicate an exceptionally high resistance, you can control a part of the trouble caused by faulty caps. There is, however, no way for you to determine the condition of the detonating chemicals inside the cap. Use at least two number 8 electric blasting caps in each separate explosive charge in a bore hole. Be sure that a sufficient amperage and voltage is available to care for an electric blast. Most of the explosive makers have prepared, and will send you for the asking, a table for figuring current needs for different conditions. I personally think it is wise to use not only the same make caps in all the holes of a shot, but also to use the same length exploder wires on all the caps in a shot, equalizing, as nearly as possible, the action of the electric current on all the caps. Avoid multiple connections as much as possible, especially when using alternating current, for this is prolific source of misfires. It is better to arrange your transformer to have sufficient current to be safely able to connect every cap direct to the lead line on the shot. A blasting machine will give variable results. Do away with its use if possible, but if you must use one don't forget that with a two-post machine all the caps must be connected in one series or circuit. In general, when using electric blasting caps do not abuse the insulation on the wires, make all splices or connections good and tight, and keep all bare wire off the ground. Scrape to brightness all wires to be spliced. When you encounter trouble in the electric blasting process don't go on and trust to luck. Get some one on your job to find and tell you what is wrong.

Fuse and ordinary blasting caps used mainly for block-hole work in secondary blasting, can cause an extraordinary amount of trouble if not stored and handled properly. An immense amount of energy is stored in the business end of a blasting cap and can cause some costly damage if they let go at the wrong time and in the wrong place. They are very sensitive to sharp blows and should not be

mashed in the blacksmith shop between the anvil and a hammer. It may seem just a little foolish for me to use your time telling you that a pants or shirt pocket, or an open box, is not a fit place to carry or store blasting caps; and that they ought never be stored or carried adjacent to explosives. In an Ohio State Safety meeting last month we were advised from a credible source that last year over nine hundred accidents were caused by the improper use of blasting caps.

It pays to buy and use well made forty-second fuse, but don't kink it to unroll it when it is cold and brittle, and don't expect it to function when allowed to draw dampness. A good "pop-shooter" is a valuable man. He gets the big pieces down to small ones for you, and he dosen't leave any unexploded charges in the rock to go through the dipper, into the cars, and down to the crusher to finally let go with a shower of hard rock in your crusher-feeder's anatomy. But don't skimp his good work with poor, cheap fuse; and don't growl about the extra six inches he cuts on the length to make himself and the rest of the boys twenty seconds safer.

Is it necessary to say that when making any kind of a blast the responsibility rests with us to be positive that everything is ready for the blast before we fire it? Highways should be guarded by men with red flags, respect should be given to possible approaching electric or steam trains, your men should be all well in the clear. Insist on the elimination of the chance takers. We may as well get into the habit now of being responsible for human safety adjacent to a blast because it won't be long until we will have to consider the traveler in the air. Place a good sensible man, who has the time to actually be on the blast himself, in charge of your blasting, and you will have gone a long ways toward the prevention of accidents due to the use of explosives.

Credit Circulation Is 500 Billion

According to a statement issued by the committee on credit policies and methods of the National Association of Credit Men, the credit circulation of America during the past year was $500,000,000,000, which is more than fifty times the money value of the United States. In pointing out the enormous value placed on promises the statement recommended that all possible effort be made to preserve good faith in credit transactions and that drastic punishment be inflicted upon anyone using credit for criminal purposes.

"It is also interesting," says the statement, "to see how the volume of credit has expanded in the last quarter of a century. When we turned into this century, the credit exchanges annually were approximately $85,000,000,000. How is it possible to use a perfectly intangible medium in such large volumes, and that its rapid circulation should make possible our present extensive commerce?

"It is not a sentiment, but a strict necessity to appeal for good faith where promises are exchanged for value, to stop at nothing that will preserve good faith in such transactions, and to punish those who use credit for criminal purposes."

Half of World's Antimony Used in United States

About 50 per cent of the world's production of antimony finds its way into the United States, and in times of peace 75 per cent of the imports are utilized in the manufacture of type metal, antifriction bearings for machinery, britannia metal, and hard metal (antimonial lead), according to J. W. Furness, mining engineer, Bureau of Mines. Of the 30 odd uses to which antimony is put, virtually all can be taken care of satisfactorily by substitutes, many of which are on a stronger industrial footing than antimony and its alloys; as an example, in the hardening of lead either calcium, barium, strontium, magnesium, or copper may be used. Alloys of barium and calcium successfully compete with antimonial alloys as bearing metals. Antimony is used as a pigment and as a mordant, but many metals can be used satisfactorily in its place. Antimony does not seem to possess any characteristics that make it irreplaceable. Broadly speaking, it is a cheap metal which can be used as a substitute for more expensive metals, and in many uses it replaces them and is not as a rule replaced by them.

U. S. Has Produced Much Bauxite

The total production of bauxite in the United States from the beginning of the industry in 1889 through 1925 was 6,045,394 long tons, valued at $33,513,987, according to the Bureau of Mines, Department of Commerce. The quantity produced in the period 1889 to 1895, inclusive, was 0.9 per cent of this total, and for the period the average value f. o. b. mines was approximately $3 a ton. In the following decade, 1896 to 1905, 5.2 per cent of the total was produced and the average value was about $4; in the next decade, 1906 to 1915, 25.5 per cent was produced with an average value of about $5; and in the last decade, 1916 to 1925, 68.4 per cent with an average value of about $6.

The first bauxite produced in the United States was that obtained in 1889 from deposits in the north Georgia field. In 1891 the Alabama deposits made their first production, and practically all the bauxite mined in the United States until 1899 came from these two states. The Arkansas deposits made their first output in 1896, but it was not until 1900 that their influence was felt. In 1907 the Tennessee deposits first began shipments.

SAFETY IN CEMENT AND QUARRY INDUSTRIES

By R. H. Lansburgh, Secretary of Labor and Industry for Pennsylvania*

THE Cement Industry is the most nearly completely organized for safety of any in the United States. The closely knit organization which has been developed extends not only throughout the cement plants themselves, but into the quarries in connection therewith. The quarry industry, other than that portion of it which is connected with the cement plants and certain outstanding large operators probably here represented, is almost totally unorganized for safety. This condition represents a challenge to those of you interested in quarry safety, peculiarly because of the extremely hazardous nature of the quarry industry and the fact that a very large majority of its accidents are of the type which can only be reached through effective safety organization.

There is probably no other industry in the country where such a large percentage of accidents arise from non-machine causes, or where safety practices, as developed from experience within the industry, bear such an important relation to accident reduction. Five causes stand out prominently as representing about seventy-five per cent of all accidents in the quarries of Pennsylvania. The statistics of the United States Bureau of Mines indicate similar condtions throughout the United States. The five causes are as follows:

1. Explosives and Explosions
2. Cars and engines
3. Falling objects
4. Falls of persons
5. Handling materials.

Explosives and Explosions

The first cause is one which to consider brings with it endless discussion of the handling and use of dynamite. Experts claim dynamite cannot prematurely explode, but accidents reports show continually from one to six persons injured by premature explosion of dynamite. Examples of accident reports are as follows: "Man preparing to charge a hole, the dynamite exploded and killed one man and injured four others." Another, "Men were charging a hole in the quarry, the dynamite exploded injuring four men." In the first instance the man who prepared the charge should not have been permitted to carry the charge into the body of men working on the bank. Only the person necessary to place the charge should have been permitted to handle it or be near it. He should not have been permitted to create an unnecessary hazard which did not in any way assist in the carrying on of the work. In the second case, when charging holes for blasting, seldom if ever is it necessary to have more than two persons, and in many instances only one person is necessary to prepare the blast. In every instance the number of persons handling the charging always should be kept down to the minimum because of the danger of premature explosion.

Another type of accident reports reads: "Two charges of dynamite had been placed, both charges being connected with the switchboard. After the charge had been set off these six men returned to the place to work, when suddenly one charge which had failed to go off discharged, injuring all six men." In this case after the charge had been set off, only the person in charge of the blasting should have been permitted to return to the working place, and he should have made a thorough and complete inspection of the cause of the second charge failing to fire before permitting the other five men to return.

Cars and Engines

This class of accidents in general is caused by lack of supervision and a disregard for the well-known safety practices. Oil and gas engines operated in quarries where artificial light is seldom used should not show such a heavy toll of human life or such a large number of non-fatal accidents.

Tom Smith was riding on the trip. He cut the engine loose and fell under the trip. Death resulted two hours later. He should not have been permitted to ride on a loaded trip. If he was the conductor, he should have ridden on the engine and not on the trip. If the track had been properly graded it would not have been necessary to make a flying switch, which evidently caused this accident. Flying switches can be entirely eliminated by proper grading of the track, which can be done in most quarries at very little expense.

John Brown was assisting the workmen to replace a car on the track when the engineer started the engine, throwing Brown under the car. A fracture of the left leg and facture and laceration of the right leg resulted. If the foreman or other person in charge of retracking the car had been a real safety man, he would not have permitted the engineer to move the engine until he was certain that every person assisting in the retracking was out of the danger zone.

Jim Green was loading a car when the car upset, pinning him underneath, which resulted in a compound fracture of the left leg. This case illustrates clearly the necessity of placing only competent persons in charge of quarry operations. It seems impossible to believe that a foreman or other person having charge of a quarry failed to see that the load was so heavy on one side that a car would

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topple over and injure the workmen. Proper supervision could and will prevent such accidents.

Falling Objects

Accidents due to falling objects are principally caused by falls of material and clearly illustrates the necessity for careful inspection of the working face. Too much emphasis cannot be placed upon face inspection, as the following accident reports show: "While employe was loading shale into a car a piece of shale fell from above, striking him on the head, causing a fracture of the skull. Death resulted ten days later."

"Employe was repairing channelling machine. A piece of stone fell striking him on the head, causing instant death."

"Employe was charging a hole for a blast when a stone fell from above fracturing his right arm."

"Employe was barring stone when a loose stone fell from above fracturing his left foot."

"While loading shale, a piece fell from the face and employe suffered a bad contusion of the left leg."

Such reports are received by us daily from the quarries of Pennsylvania and illustrate the necessity not only for daily inspection but also for constant inspection of the working face. If the foreman cannot find time, the plant must provide for inspection by a competent person during the time when men are loading and before men are permitted to commence drilling. Face inspection is one of the most important means of reducing accidents.

Falls of Person

The nature of quarry work requires men to be at the face during almost every hour of the day, and they are here constantly in danger from slides and falls. The use of life lines and belts is the greatest safety factor for men employed in this class of work. To illustrate the necessity for life lines and belts in such operations the following accidents are available: "Employee was working at the top of the quarry, his foot slipped, causing him to fall 40 feet into the quarry. Death followed a few minutes later."

"Employe was barring stone from face when another stone fell from above, causing him to lose his balance. He fell into the pit below and received injuries which caused his death the following day."

"Employe barring stone from ledge, 15 feet above the quarry floor when his pick slipped, causing him to lose his balance, falling into the quarry and resulting in serious injuries."

"Man was barring stone when a piece of stone struck him, knocking him from the ledge. He fell 8 feet into the pit and death resulted from the injuries."

This is sufficient evidence of the need of life lines and belts in quarry operations. While the use of these devices would not have prevented these accidents, I am positive they would have prevented loss of life in the three fatal cases cited.

Handling Materials

Handling materials stands out very conspicuously among the accidents in quarry operations. During the first six months of 1926, fifteen per cent of all accidents in the quarries of Pennsylvania are charged to this cause. Broken bones, mashed fingers and injured hand and feet result from the careless handling of material. Failure to use goggles when loading and breaking stone is responsible for many of the accidents charged here. The following type of accident reports are commonplace:

"Man was loading stone when a piece of stone flew from the hammer of another employe, striking him in the eye." "Employe was breaking stone with a hammer when a piece of stone hit him in the eye." "While loading stone, a fellow employe pulled down some loose stone and before injured man could get out of danger his foot was mashed." "Fellow employe was pulling rock down from ledge, when it broke, rolled down and crushed injured man's leg."

This type of accident clearly indicates the lack of safety spirit caused by lack of the proper safety organization, and it is evident that a campaign of education among foremen, as well as employes, is necessary to reduce this type of accident, as well as the other types which have been discussed.

The interesting fact about a large percentage of quarry accidents is that there is no complicated engineering problems involved in their prevention. Accidents from machinery are relatively few. The present accident situation in the quarry industry in the United States represents a challenge to you who are interested peculiarly in quarry safety to stimulate the interest of that great mass of quarry operators who, as yet, have paid but little attention to that element in our daily industrial life—safety.

Billion Dollars More of Wages

The far-reaching influence of a billion dollars added to the contents of the pay envelopes of factory workers alone cannot be measured and is even hard to conceive. Going back to 1914, during which year the entire amount of wages paid to all workers in all factories in this country was only $4,000,000,000, we may get some idea of what a billion dollars added to factory workers' wages really means. The total of factory workers' wages paid in 1921 amounted to $8,000,000,000 and, in 1923, the total was $11,000,000,000. During the succeeding three-year period, whatever the total of wages might otherwise have been, our foreign shipments of manufactured goods added more than a billion dollars to the amount.

WIRE ROPE AND ITS USE TODAY

By H. L. Williams, Consulting Engineer, Williamsport Wire Rope Company*

WIRE rope is not a recent invention—its history dates back to the past ages—but I have no desire to tax your patience by tracing its history from the dark ages down to the present day. I feel sure you are more concerned about wire rope and its use today. Wire rope is a highly specialized product, a delicate piece of mechanism, and great care should be taken to use the correct grade and construction for your purpose, and proper care should be given the rope before and while in use. Wherever wire rope is used, human life is endangered. We cannot emphasize this point too strongly.

Proper Wire Rope to Use

When you purchase equipment using wire rope, it is a pretty safe rule to use the grade and construction of wire rope specified by the engineers designing the equipment because they have given the problem careful study, and wire rope manufacturers endeavor to work with the equipment manufacturers in deciding upon the best rope to use for their equipment. Of course, if you alter the equipment after purchasing, it may be necessary to change the grade or construction, or both, or the wire rope. However, this should be done only after careful investigation, and if necessary, after submitting your problem to the manufacturers of your equipment or to a wire rope engineer. In fact, all your wire rope problems should be submitted to an engineer and not left to the average salesman who will probably recommend that you use his company's Sky-Blue-Pink Strand because it is the highest priced and strongest rope they make. Perhaps it is the best rope for some purposes, but it may not be the best rope for your purpose.

Some may recommend that you use a special or freak construction made only by his firm and given some fancy name. These furnish good talking points for salesmen and may be adapted to special purposes, but that does not necessarily prove that they will give good service on your equipment. In fact, my experience has been that none of these freak constructions stay on the market very long, and eventually their users all go back to standard construction.

In buying wire rope you should be absolutely certain that you are getting the quality specified. It is difficult, almost impossible, for an expert to tell the grade of material used in wire rope by its appearance alone. How, then, can you expect your storekeeper or supply man to be sure he is getting the grade of rope that was specified? This is a very important factor from the safety standpoint. Most manufacturers realize the importance of this point and have taken steps to identify their highest grade rope by a painted or colored strand, but their other grades of ropes are not so identified. This fact induced our company to place a distinct printed marker running through every foot of the hemp core of each separate grade of wire rope we manufacture.

Very often an operator, in case of an emergency, will accept anything that looks like wire rope in order to keep going and avoid the expense of a shutdown. This can be avoided. Wire rope users should carry a spare rope for the same reason that automobile users carry spare tires.

Care of Wire Rope After Received

After you receive your rope, be careful to protect it from the weather and from injury until you are ready to install it. A 5/8-inch 6x19 wire rope (6 strands of 19 wires each) made in one size wire construction contains 114 wires of .040 to .042 inches in diameter. Some other constructions of this size (5/6-inch) contain wire much smaller in diameter. While a 5/8-inch rope is strong and rugged, you must realize that the individual wires, being small, will not stand much abuse. The reel containing the rope should not be rolled over sharp objects. Heavy or sharp objects should not be thrown on top of reels or coils. Trucks or cars should not be allowed to run over rope. Acid should not be allowed to come in contact with wire rope. If the rope is not to be installed at once, it should be thoroughly lubricated to prevent rust.

Installing Wire Rope

When you want to break a wire, you first kink it, which causes it to break very easily. A kink in wire rope has the same effect. A wire rope that has been kinked is sure to give you trouble. A large percentage of the trouble reported to wire rope manfacturers is caused by rope being kinked either before or after being put into use. A wire rope so damaged may give way after being in service but a short time, causing much damage and even loss of life. Very often the employe is not aware of the damage done to the rope by kinking.

When wire rope is received on reels, do not allow workmen to lay reel flat and pull or loop the rope off as you would manila rope. The reel should be placed on a spindle or shaft and the rope taken off by revolving the reel. If the rope is in a coil, it should be uncoiled by rolling along the floor or ground. Never lay the coil flat and pull the rope from the coil.

When installing wire rope, be sure sheaves are in line and that rope is not binding or chafing

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against side of sheave. Never pound wire rope with a steel hammer. The wires being small cannot stand this abuse. Be sure the sheaves, drums, guides and rollers are not scored, especially when putting on a new rope. A rope in use is usually pulled down some in size, therefore the score worn in the sheave, drum, etc., is usually smaller than the diameter of the new rope. This will cause serious damage to a new rope. When two moving objects come in contact there must be wear. Sheaves, guides, rollers, etc., should be made of softer material than the wire rope or the rope must sustain the wear. It is a question of which you would rather have sustain the wear; the sheaves, etc., or the rope.

Lubrication

This is an important factor and cannot be too strongly emphasized. Proper lubrication will reduce the wear caused by rope operating over sheaves, etc. It will also prevent rust and corrosion. Most of the oil companies have oil or grease prepared especially for wire rope lubricating and dressing. A dressing containing graphite is probably the most satisfactory. It should also contain penetrating oils so that the inner wires are lubricated, reducing internal friction and preventing rust. This is very important from a safety standpoint as often the inner wires will fail because of rust or corrosion while the outer wires may show very little rust.

Fittings

Thimbles should be used where the rope is to be looped or where in attaching it is necessary to make a short bend. Unless a thimble is used, wires in the rope are likely to be damaged, causing rope to give way. In attaching clips be sure that the live or working end of the rope is placed in the base of the clip, while the U-bolt will bear against the loose or dead end. This will prevent crushing the rope bearing the load and breaking many of the wires. No matter how many clips are used they should all be put on in this manner. When putting on sockets, etc., be sure not to allow any strands of the rope to become slack. One or more slack strands will throw the burden on the other strands, reducing the strength of the rope.

In conclusion let us consider some of the causes for the failure of wire rope in service, in addition to the ones we have mentioned, and consider means of preventing these sudden failures. We have mentioned:

Specifying wrong grade, size, construction, etc.
Not getting grade specified.
Abuse of rope before and after installing.
Bad sheaves, drums, guides, rollers, etc.
No lubrication, or wrong kind of lubricant.
Improper adjustment of fittings.

It is rather easy to watch the natural wear of wire rope in service. It is the sudden giving way that causes damage and is so important from a safety standpoint. Crushing rope by allowing it to pile up on drum, or by getting caught between sheave and frame of machine, or caught in some other manner, is one of the causes for sudden failure of ropes. Jerking wire rope or overloading it will strain it beyond its elastic limit and after being so abused, it is likely to give way at any time, even with a small load. All manufacturers are doing everything possible to put out the best wire rope than can be manufactured, and if the users of wire rope will do their part in watching the points mentioned, a great many delays and accidents can be avoided.

Third Potash Exploration Area Designated

Location of the area designated as third in order of availability for purposes of potash exploration in the course of the Federal Government's campaign to develop an independent American potash industry is announced by the Bureau of Mines, Department of Commerce, as centering at the Mid-Kansas Harris Bros. Number 1 oil well, in the southeast quarter of Section 20, Block H-H2, Gulf, Colorado and Santa Fe Railway Survey, Crockett County, in central western Texas. This is one of four alternative sites recommended by the United States Geological Survey under the terms of the Act of Congress approved June 25, 1926, which appropriates the sum of $100,000 per annum for a period of five years, to be expended under the direction of the Secretaries of the Interior and Commerce in a search for commercial potash deposits. Location of the first and second potash exploration sites, both in Upton County, Texas, in the same general area as the third site, was recently announced.

The third potash exploration area is located in a section temporarily abandoned for oil prospecting purposes following the drilling of a number of dry holes. The top of the potash-bearing salt beds lies 1,000 feet below the surface. The maximum depth required for potash prospecting will probably be 2,000 feet. Oil well cuttings show excellent polyhalite. The well site is 25 miles south by road from Rankin, on the Kansas City, Mexico and Orient Railroad in Upton County. It is permissible to drill the test hole within a radius of two miles.

Under the provisions of the enabling Act, the Bureau of Mines is required to negotiate drilling contracts with all land owners and holders of mineral rights within the designated area before the drilling of a test hole can be undertaken. The development program could, therefore, be blocked by the refusal of any land owner or holder of mineral rights to accept the terms offered by the Federal Government.

SAFETY EDUCATION

By W. S. Smith, Safety Department, Ford Motor Company*

SAFETY education can be divided into three headings as follows:

(a) General: as it effects the whole industry
(b) The new employee
(c) The trained or experienced employee.

General

A leading professor has stated that education is simply the appreciation of what we study and read in books and gain in experience. For example, we can give a man a complete set of rules on the safe operation of his job. He may be able to repeat every rule word for word, but unless he can fully appreciate the reason and value of each rule, then the education has been a failure. It has been truly said that safety work is 75 per cent education and 25 per cent mechanical. Therefore, our efforts must be concentrated on the training and instruction of the employe. A leading safety engineer was once asked if he would prefer a plant with no guards on the machines and men who had education in safety or a plant with guards on every available place and men untrained in safe operation. He at once favored the plant where safety education was established. No matter how much we protect an industry with mechanical devices, they are of very little avail unless the operator is trained and our training must be thorough.

The New Employee

Here lies our greatest responsibility. I do not believe we realize just what it means to enroll a new man and put him to work. There are so many handicaps and small details that contribute to his danger.

1st. The newness of his surroundings.

2nd. The anxiety of making a success of his new job resulting in an over enthusiasm to rush in with no thought of danger.

3rd. The suspicion that he will be despised if he shows signs of nervousness.

4th. He may have been out of employment for a considerable time and carry a lot of worry regarding his home and family.

To overcome these handicaps the first step is to instruct the man immediately he reaches the employment office, thereby giving him confidence that his new field of activity is going to be among men who believe and practice safety. Safety bulletins on the wall and a card of welcome containing safety rules are practical samples of making the new surroundings appear welcome. Next the employee should be examined as to his fitness to do the work for which he is making application. This test, of course, should be physical as well as from a point of view of experience. There is no question of the hazard of putting a man on a job for which he is mentally and physically unfit.

Providing he meets all the requirements of experience and has received the preliminary instructions in safety, his road is more or less easy and supervision in safety work should do the rest. The following are a few samples of educational activities which will help in training the new employee:

(1) Bulletins in employment office
(2) Safety card outlining general safety rules
(3) Instructions by foreman
(4) Set of safety rules governing his job
(5) Safety moving pictures
(6) Safety committee man in his department
(7) Personal talk by safety engineer

Practical demonstration of safety equipment and application of rules are amongst the most effective methods of convincing the new man. There is no use lecturing and wandering into paths of theory and rhetoric unless we get down to earth and show the man by demonstration that our ideas and equipment will protect him. In a certain foundry the men left leggings and shoes off and considerable trouble was experienced in making them wear this particular equipment because they falsely thought molten metal would simply go through just as if it were tissue paper. The men were collected and two or three pairs of leggings spread on the floor; molten metal was poured on them and rolled off into the foundry sand. This experiment proved so successful that no future trouble was experienced. Therefore, we must be leaders and let the man see the safe road and there is no question but what, in the majority of cases at least, he will follow the trained or experienced employee.

The Experienced or Trained Employee

It is a peculiar and also regrettable fact that some of the worst violators of safety rules are the experienced men. It very often happens that men of ten years' service are amongst the offenders. This is probably due to familiarity with their job on the one hand and a false impression of their skill on the other. Education by discipline is probably the best remedy.

The question of discipline immediately creates a long drawn out argument, but there is very little question but what the enforcement of safety standards are essential to accident prevention. Of course, we must be leaders before we are dictators and very often if led the right way men will admit that they are violators.

One system which has proved most successful is the method of having men who violate safety rules come to the office and study safety bulletins on their own time. And a very high compliment is paid to the National Safety Council bulletin system when

*Presented before the Quarry Section of the National Safety Congress at Detroit, on Thursday, October 28, 1926.

I say many men after they are told to go home request permission to look over the remainder. Care is always taken to avoid humiliating the man when he comes to the office, and taken all together, this system has proved fair, popular and produced results.

Another incentive in training the experienced man is to promote men who have a good safety record. This encourages the others to realize that a man must be first class in safety as well as in his particular kind of work. Education is the Beacon Light on the Sea of Safety. The more luminous we make that light the more readily will the dangers be observed. There is something sacred about safety work when we realize that our efforts are crowned by something other than the cold metallic ring of cash.

Borax Companies Cool Death Valley

Lying to the west and southwest of the Salt Lake City, and extending to the Sierra Nevada and the range east of Los Angeles, is an area designated as the Great American Desert. A section of this, lying in southeastern California between Telescope and Panamint Mountains and over 200 feet below sea level, is called Death Valley.

Practically all of the development of Death Valley has been undertaken by parties interested in borax. "Colemanite" (borate of soda) is found in the hills and mountains high above the flats of the valley bottoms, while "cotton ball" (borate of soda) is found in the flats. But one serious difficulty has been encountered in mining these salts; this has had to do with the prevailing high temperature and low humidity. During the summer months of July, August and September a daily temperature of 130 degrees in the shade is a frequent occurrence, while as late as November a temperature of 80 to 90 degrees is to be expected. It is evident that the intensity of living and working conditions in this desert area must be extreme. From this has followed the desert law that whatever is done here must be done better than anywhere else.

First step in this direction was taken by the Pacific Coast Borax Company. At a distance some fifteen miles from Death Valley Junction is a borax mining station of this company consisting mostly of bunk houses, with the usual company kitchens, rest rooms, pool rooms, restaurants, etc. Approximately 500 persons are living at the station. Because of the conditions noted, officials of the Pacific Coast Borax Company recently decided to install mechanical apparatus for cooling, humidifying and cleansing the air throughout the station grounds. This equipment consists of nine large and four small multiblade fans, several thousand feet of heater surface, and four double bank spray type air washers. The construction and operation of the air washer is simple. The air is drawn through a spray chamber, where it comes into contact with a minutely atomized spray of water. A large number of spray nozzles are used and evenly spaced in the chamber, insuring an even distribution of mist. The mixture of the spray and air is very thorough, so that every particle of dust is made wet and heavy by the spray.

The evaporation of a portion of the spray water humidifies the air and the amount thus evaporated depends upon the despoint desired. When it is necessary to heat the water, the system of humidity control provided insures a simple method of heating. In the summer months the air is cooled by one of two different methods. First, where a system of recirculation is used, the air is cooled by evaporation; that is, the heat necessary to evaporate the water is extracted from the air. This gives the greatest cooling on the hottest days. The second method of cooling is to use cold water in sufficient quantities in order to obtain water condensation, thus lowering the humidity.

Important Research Board Meeting Planned for December

Plans for what is expected to be the largest and most important meeting of highway officials ever held in Washington have been definitely put under way by the Highway Research Board of the National Research Council. The final plans for the sixth annual session of the research board were completed at a meeting of its executive committee at the National Academy of Sciences, October 28. Charles M. Upham, director of the Highway Research Board, has invited all road officials, contractors, material and equipment manufacturers and representatives of other industries interested in highway research to be present at the meeting to be held in the National Academy on December 2 and 3.

"This meeting will not only bring out the important achievements of the Highway Research Board during the past year," Mr. Upham said, "but will conclusively prove the value of additional research activities in the future. The growth of the Highway Research Board of the National Research Council has been in direct relation with the importance of the work it has carried to completion. Its work in cooperation with the United States Bureau of Public Roads and many other public or public-spirited organizations has and will continue to be of great importance to economical road construction."

The executive committee which will convene the week previous to the general meeting, is composed of Dean A. N. Johnson, chairman; W. H. Connell, engineering executive of Pennsylvania Department of Highways; Thos. H. MacDonald, chief of the United States Bureau of Public Roads; T. R. Agg, Iowa State College; A. J. Brosseau, Mack Trucks, Inc.; H. C. Dickinson, U. S. Bureau of Standards, and W. Spraragen, National Research Council.

IDAHO LIME COMPANY DEVELOPS RAPIDLY

THE Idaho Lime and Marble Company operates a plant located in the narrow canyon of Bed Rock creek, about two miles from the town of Agatha on the Clearwater River. The deposit, which is near the plant, is virtually a mountain of lime, towering upward for 1,000 feet. Operations were started to remove this limestone in September 1924 and in less than a year 4,250 tons of product had been sold.

In July 1925 the plant was almost completely destroyed by fire so that production had to be suspended. However, in three months by concentrated effort the plant was rebuilt with larger facilities for an increased production and was again in operation. This enlarged plant has been necessitated by the increasing demand for the product of this company. To show the extent of this enlargement, the crusher installed in the plant which was destroyed required 15 horse power to drive it, but the installation in operation in the new plant provides 150 horse power.

The quarry deposit is dolomite and analyzes from 37 to 42 per cent magnesium carbonate and 54 to 60 per cent calcium carbonate. The principal business of this company is manufacturing chicken grits and agricultural limestone for sweetening soil, known as agstone. Other products are stucco dash for buildings, etc., and white sand which is used extensively in cast stone work in connection with cement.

In operating the quarry the stone is blasted from the deposit and where necessary, when the blocks are large, broken into convenient sizes for handling

Some of the Employees Quarters

Part of the Deposit and the Mill

Interior Mill View. Note the Light and Clean Appearance

Type of Highway and Country Surrounding Plant

in the mill. The broken rock is then conveyed from the quarry on dump cars, operating on tracks, to the mill which is close at hand. The proximity of the quarry to the mill, also the tracks and one of the dump cars is shown in one of the illustrations.

When the rock reaches the mill it is fed into a Blake jaw crusher which performs the primary crushing operation. After passing through this primary crushing the material is carried by an elevator to a scalping screen. From this screen the material is carried by an elevator to a Williams hammer crusher which reduces the rock to ½ inch and less. After passing through the hammer crusher the material is conveyed by another elevator to a rotary screen which separates the lime rock into five sizes.

Tailings from the rotary screen are crushed by a set of heavy rolls from which the material is conveyed to a set of vibratory screens. The fine material passing through these screens is fed into a Raymond mill where it is pulverized into fine limestone. This limestone is then packed into bags ready for shipment.

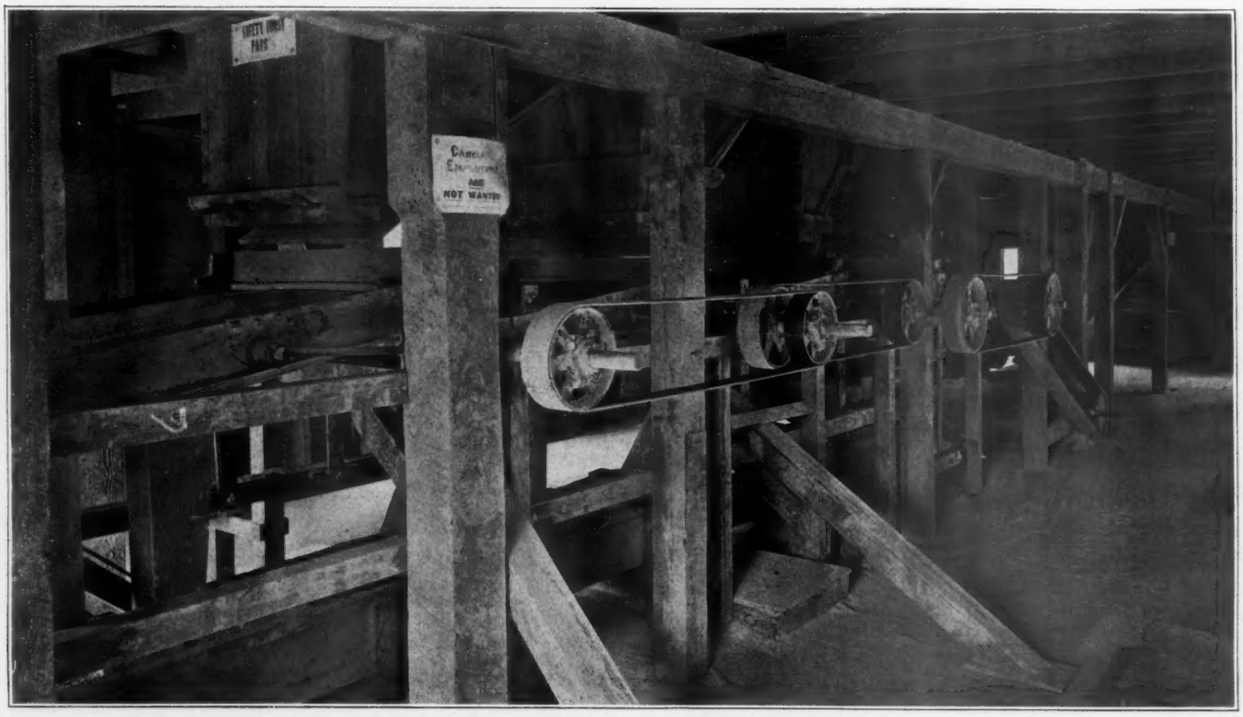
This plant is producing approximately four car loads of chicken grits and three to four car loads of agricultural lime each week. The former production is marketed and advertised as Clearwater Crystal White Chicken Grits and sold extensively over the Pacific Coast by jobbers and poultry associations.

The product of the plant is conveyed in trucks to Dolomite, Idaho, about two miles from the mill, which is on a branch line of the Northern Pacific Railroad. The road used when hauling this distance, from the mill to the shipping point at Dolomite, has been surfaced with white dolomite material taken from the quarry deposit. This surfacing has been found to prove very satisfactory as it resists the heaviest torrents of rain and also wear and tear of the trucks passing over it day after day. One of the illustrations shows a portion of this road and its wearing qualities are apparent. The workmen's quarters, which are near to the plant, are illustrated.

Interior View of the Storage Unit

The owners of the plant are A. J. Warren and H. J. Kressly, Roy Ginrich, is Engineer, and also acts in the capacity of superintendent. Mr. Ginrich in conjunction with Julius Hansen, millwright, is responsible for the efficient mechanical and highly productive operations of the plant.

A study of the situation shows clearly that general conditions are a composite of often widely differing local circumstances and happenings. But the great preponderance of "good" and "very good" shadings is a favorable portent as to the course of business during the coming months.



Interior Mill View Showing the Screening Unit

Crushed Stone Association Officials Making Transcontinental Trip

The officers of the National Crushed Stone Association, including Otho M. Graves, president, A. T. Goldbeck, director of the bureau of engineering, J. R. Boyd, secretary, and one or two directors, are making a transcontinental trip through the states west of the Mississippi River for the purpose of establishing personal contact with the producers of the several states. Those making the trip will endeavor to ascertain to what extent the National Crushed Stone Association may be of material benefit to the territories visited.

An itinerary has been arranged. In some instances the exact time and place of the meeting are not given. All crushed stone producers are invited and urged to attend. Where the time and place for the meeting are not given an inquiry to the men in charge will bring the information.

The many new services of the National Crushed Stone Association inaugurated during the past year should be of interest to all crushed stone producers for the practical value these services have in promoting a crushed stone business. These new services and the activities of the association in general will be discussed and the various meetings planned.

The schedule of meetings to be held in connection with the transcontinental trip of the Officers of the National Crushed Stone Association, and the men in charge are:

Madison, Wisconsin, Meeting Monday, November 8th	1:00 P. M.—Hotel Loraine (luncheon meeting)	Mr. A. J. Blair, Lake Shore Stone Co., Milwaukee, Wis.
St. Paul, Minnesota, Meeting Tuesday, November 9th	1:00 P. M.—Minnesota Club (luncheon meeting)	Mr. John Wunder, Broadway and K Streets, Minneapolis, Minn.
Omaha, Nebraska, Meeting Wednesday, November 10th	9:00 A. M.—Hotel Fontenelle	Mr. Thos. Sullivan, 1042 Omaha National Bank Building, Omaha, Neb.
Cheyenne, Wyoming, Meeting Thursday, November 11th	10:00 A. M.—Chamber of Commerce	Mr. C. J. Cunningham, S. Cunningham & Son, Horse Creek, Wyoming.
Denver, Colorado, Meeting Thursday, November 11th		Mr. James Lawrence, Golden Basalt Products Co., Golden, Colo.
Salt Lake City, Utah, Meeting Saturday, November 13th	3:00 P. M.—Chamber of Commerce	Mr. Eric Ryberg, P. O. Box 1214, Salt Lake City, Utah.
Portland, Oregon, Meeting Thursday, November 18th		Mr. Daniel Kern, 294 E. Salmon Street, Portland, Oregon.
San Francisco, California Meeting Monday, November 22nd	10:00 A. M.—Palace Hotel	Mr. A. R. Wilson, Granite Rock Company, Watsonville, Calif.
Los Angeles, California, Meeting Probably Tuesday or Wednesday, November 23rd or 24th		Mr. Geo. A. Rogers, 1403 E. 16th Street, Los Angeles, Calif.
El Paso, Texas, Meeting Monday, November 29th	10:00 A. M.—Hotel Orndorff	Mr. A. Courchene, El Paso Limestone Quarry, El Paso, Texas.
San Antonio, Texas, Meeting Tuesday, November 30th	10:00 A. M.—Hotel Gunter	Mr. R. J. Hank, 310 Littlefield Building, Austin, Texas.
New Orleans, Louisiana, Meeting Thursday, December 2nd	10:00 A. M.—Hotel St. Charles	Mr. I. L. Lyons, Jr., Southern Mineral Company New Orleans, La.
Atlanta, Georgia, Meeting Friday, December 3rd	1:00 P. M.—Atlanta-Biltmore Hotel	Mr. Thos. McCroskey, Box 292, Knoxville, Tenn.
Nashville, Tennessee, Meeting Saturday, December 4th	10:00 A. M.—Andrew Jackson Hotel	Mr. A. B. Rodes, 610 12th Avenue N., Nashville, Tenn.

PIT AND QUARRY FOREIGN DIGEST

Cause of Setting Trouble With Aluminous Cement

THE "sanding-off" scale often found on the surface of air cured aluminous cement, and which can be removed with the finger nail, has been found to be due to the action of the carbon dioxide of the air. Any method of setting which prevents the contact with the CO_2 also prevents the formation of the "sand scale."

Test cakes made with "Alca" cement and water, when kept in moist air formed a scale about 0.5 mm. thick. In at atmosphere of moist CO_2 scale was thicker, about 0.8 mm. But in air, in a desicator over caustic lye, in oxygen over caustic lye, in vacuum over drying agents, and by other means of avoiding contact with CO_2 no scale was formed. The scale is light brown, and solid cement dark gray. Furthermore, covering the cakes with a moist cloth after a few hours setting very much hinders the scale formation. Analysis of the scale showed a CO_2 content of 4.6 per cent, of the hard cement 1.6 per cent (Dr. H. W. Gonell, Zement, Vol. 15, p. 714-715, 1926).

Fused Aluminous Cement

Curves showing the crushing strength as a function of the chemical composition are shown. The limiting figures for "fused high aluminous cements" are established as 45-70 per cent $A1_2O_3$, 47-28 per cent CaO, 12-0 per cent SiO_2. A series of curves in triangular coordinates is shown, demonstrating that the setting time is also a function of the chemical composition. The former is also influenced by the fusion temperature, the time of fusion, the rate of cooling of the melt, the fineness of pulverization and the curing. The chemical composition determines the melting point. These cements are completely resistant to 15 per cent NaCl, 12 per cent $MgSO_4$, and 10 per cent $KHSO_4$ solutions. They showed no effect after six months (Berl and Loblein, Zement, Vol. 15, p. 715-719, 1926).

Stabilizing Raw Clay from Water

Experiments to produce a cheap building material have been carried out on clay. The object was to find a substance which when added to raw clay would stabilize it against water. Alkalis up to 5 per cent increases susceptibility to attack by water, larger amounts make the clay immune, and still larger quantities make it susceptible again. Phosphoric acid either free or in the form of phosphates makes the clay quite resistant to attack. The shrinkage on drying is also reduced, especially if 10 per cent asbestos is added. It does not affect the tensile strength unless it is added as calcium phosphate and sulphuric acid, when it increases it by 50 per cent. But the action of phosphoric acid depends on the composition of the clay, only those clays with a silica content were stabilized by 3-6 per cent phosphoric acid. Its mode of action is not known (P. P. Budinkov, Kolloid, Z., 1926, 39, 269-275).

Fire Resistant Concrete

The cement is mixed with aggregate containing alumina and also with materials containing soluble silicic acid which will combine with the free lime of the cement to form calcium silicate. The aluminous aggregate and the materials containing the soluble silicic acid must be ground to the same fineness of division (German Patent, No. 430,873).

Mortar Substratum

A layer of mortar as substratum for fusible organic coatings, especially for concrete receptacles is made from a mixture of cement and finely divided graphite (German Patent 430,993).

Mortar from Moist Trass

Freshly burned, still hot, quick lime is mixed with moist trass, or other moist volcanic tufa, moist slag or cinders under steam pressure and finely ground under steam pressure. The water of hydration is then removed by heat (German Patent 428,431).

Paving Materials

Plastic compositions suitable for paving materials are obtained by mixing tar, pitch, oils, conmarous resin, etc., with spent materials from the iron oxide purifiers of gas works and the heating mixture. Lime and similar basic materials may be added (English Patent, 256,513).

Facing Material for Walls

A facing-material for walls and other surfaces comprises lithopone, chalk, white cement, gypsum, white sand, diamantine (powered glass) linseed oil, white spirit, driers, and coloring matter such as yellow ochre and colcothar. The material is applied by stippling with a brush. While the coating is still soft, it is worked over with a spatula, and when sufficiently hard, sandpapered (English Patent, 256,565).

Porous Clay

In the manufacture of a highly porous material for use for insulation purposes, or as an addition to concrete, clay, preferably quaternary, is heated quickly to a temperature near its melting point, e.g., 1000 to 1050 degress C., and thereafter more slowly to a temperature at which the mass assumes a viscous consistency. The first stage may take place in a shaft furnace, and the second in a rotary furnace. The specific gravity of the product may

be decreased by the addition of bog earth (English Patent, 256,580).

Burning Limestone

Calcium carbonate is converted into the oxide by grinding until the material will pass through a 40-mesh sieve and heating to about 850 degrees C., in the presence of an agent containing oxygen, such as oxygen, air or steam. A rotating electric furnace is used preferably of the muffle type (English Patent, 256,687).

Grinding Cement

In the fine grinding of cement in ball or tube mills, the grinding-bodies used in the mill are freed at intervals from the film of adhering material with which they become coated. From a suitable point in the mill the grinding-bodies may be conducted through a clear space in the mill towards the inlet end in order to be mixed with coarser material by which they are cleaned (English Patent, 256,987).

Plasticity of Clay

The plasticity depends upon the small size of the clay particles and their reaction (chemical) with water. It is promoted by the plate form of the particles, their slight hardness, porous surface, good cleavage and by the presence of colloids (H. Salmung—Chemiker-Zeitung, Vol. 50, 1926, p. 723).

Treatment of Cement Surfaces

To make cement surfaces acid and alkali proof, they are treated with water glass solution and then with dilute sulphuric acid. The surface is now washed and dried and then treated further with a solution of sodium pectinate and finally with an emulsified tar solution (French Patent, 606,899).

High Quality Cements

Aluminous cement is low in lime but high in alumina content. following table shows difference in chemical composition of Portland and aluminous cements.

Constituent	Portland Per Cent	Aluminous Per Cent
Lime	58 - 66	35 - 45
Silicic Acid	18 - 26	5 - 10
Alumina	4 - 12	35 - 55
Iron Oxide	1 - 6	5 - 15
Titanium Oxide	0	2 - 3

The crushing strength of aluminous cement is several times that of "high quality" Portland cement after two days water or air curing. But the strength of the high quality Portland gradually increases and at the end of a year is practically equal to that of aluminous. In tensile strength the aluminous cement is only slightly superior at first, and at the end of a year is inferior in this respect to high quality Portland. Aluminous cement, however, is far more stable to salt solutions such as $(NH_4)_2SO_4$, Na_2SO_4, $MgSO_4$, NH_4Cl, $(NH_4)_2CO_3$, $CaCl_2$ $MgCl_2$ suffering no disintegration or loss of crushing or tensile strength, while Portland cement is seriously affected. On the other hand the effect of mineral oils on the two cements is just the reverse, aluminous cement being severely affected, and Portland only slightly. (R. Otzen, Zement, Vol. 15, p. 737-741, 1926.)

Reinforced Concrete Ships

Building of these structures with reinforced concrete has the following advantages. Simplicity, rapidity and inexpensiveness; great durability due to the fact that the cement continually becomes harder when in contact with water and prevents the enclosed iron from rusting; such structures are completely fireproof; safety against sinking is assured by the construction of double walls, the inner ones being sufficient to maintain flotation in case of extensive damage to the exterior; almost complete immunity to barnacle formation; great resistance to sudden shock because of the formation of what amounts to a solid stone structure. (Dipl.-Ing. Arthur Kittel, Beton u. Eisen, Vol. 18, p. 326-329, 1926.)

Physical and Chemical Properties of Slate

Slate is a natural rock, and, unlike a synthetic product, its properties are inherent and in large part are practically unchangeable, states the Bureau of Mines, in Serial 2766, recently issued. However, slates from different localities, and even from different parts of the same deposit vary greatly in physical character and in chemical composition. By diversion of each type to the uses for which it is best adapted, more serviceable and dependable products are supplied than when little attention is given to adaptability. There is a growing tendency among slate producers to gain a better knowledge of the fundamental properties of their raw materials, and to utilize this knowledge in the selection of material best suited for its intended use. It has been learned, for example, that calcium carbonate is injurious in slate exposed in any way to sulphulic acid, because the hydrated calcium sulphate, gypsum, is formed, and its formation is accompanied by great expansion which disintegrates the slate. Fortunately most of the commercial slates in the United States are low in calcium carbonate, but it has been demonstrated that slates with any appreciable percentages should not be used where acid exposure is probable. It has also been found that slates vary greatly in transverse strength. Naturally the stronger slates should be used for stair treads, sills, caps and other applications where a load must be carried.

October Construction Record Fair

October construction contracts in the 37 states east of the Rocky Mountains amounted to $515,726,600 according to F. W. Dodge Corporation. This was a decline of 8 per cent from September, and of 3 per cent from October of last year. Normally there is a slight rise in contract volume in October. The 37 states covered by this record include about 91 per cent of the total construction volume of the country.

The more important items in the October record were: $226,793,600, or 44 per cent of all construction, for residential buildings; $103,756,600, or 20 per cent, for public works and utilities; $63,601,400, or 12 per cent for commercial buildings; $45,828,300, or 9 per cent, for industrial buildings; and $23,566,700, or 4 per cent for educational buildings. New building and engineering work started east of the Rocky Mountains during the past ten months has amounted to $5,325,506,400, which is a 6 per cent increase over the corresponding period of 1925. Contemplated new work was reported last month to the amount of $637,359,900, which was a 3 per cent increase over the amount reported in September, but a 25 per cent decrease from the amount reported in October of last year.

The October volume of building and engineering contracts let in New York State and Northern New Jersey amounted to $123,553,900. Decreases of 16 per cent from September, 1926, and 12 per cent from October of last year occurred. Analysis of the construction record for this territory showed the following items of importance: $79,024,900, or 64 per cent of all construction, for residential buildings; $11,712,000, or 9 per cent, for public works and utilities; $8,575,700, or 7 per cent, for commercial buildings; $6,868,000, or 6 per cent, for social and recreational projects; and $5,233,400, or 4 per cent, for industrial buildings. During the past ten months there was $1,430,529,400 worth of new construction started in New York State and Northern New Jersey, which was a gain of 16 per cent over the amount ($1,228,237,500) for the first ten months of 1925. Contemplated construction projects were reported for the district to the amount of $182,242,300 during October. The above figure was 5 per cent above September, 1926, but was 33 per cent below October of last year.

Construction started during October in New England amounted to $31,424,200. The above figure showed decreases of 29 per cent from September of this year and 19 per cent from October, 1925. The more important items in last month's building record were: $19,091,800, or 61 per cent of all construction, for residential buildings; $3,820,900, or 12 per cent, for commercial buildings; $2,941,400, or 9 per cent, for public works and utilities; $1,938,600, or 6 per cent, for industrial buildings; and $1,575,500, or 5 per cent, for educational buildings. New England had $371,512,800 worth of construction contracts let during the first ten months of 1926, as compared with $405,997,400 for the corresponding period of last year, being a decline of 9 per cent. Contemplated new work reported for these states last month reached a total of $52,265,300. This was 55 per cent in excess of September, 1926, but 7 per cent below October, 1925.

The Middle Atlantic States (Eastern Pennsylvania, Southern New Jersey, Maryland, Delaware, District of Columbia and Virginia) had $56,917,800 in contracts for new building and engineering work last month. This was a decline of 9 per cent from September of this year. However there was an increase of 11 per cent over October of last year. Included in October's construction record were the following important classes of work: $19,148,500, or 34 per cent of all construction, for residential buildings; $15,717,500, or 28 per cent, for commercial buildings; $7,147,500, or 13 per cent, for public works and utilities; $4,591,800, or 8 per cent, for social and recreational projects; and $4,100,900, or 7 per cent, for industrial buildings. New construction started in this district during the first ten months of this year reached a total of $545,705,400, which represented a gain of 14 per cent over the amount ($476,820,900) for the corresponding ten months of 1925. Contemplated construction projects were reported for the district in October to the amount of $57,658,000. This represented declines of 21 per cent from September of this year and 40 per cent from October, 1925.

The total volume of construction contracts let in the Pittsburgh District (Western Pennsylvania, West Virginia, Ohio and Kentucky) during October amounted to $58,283,300. The above figure represented declines of 10 per cent from September, 1926, and 26 per cent from October, 1925. The October building record included the following items of note: $24,023,200, or 41 per cent of all construction, for public works and utilities; $17,114,300, or 29 per cent, for residential buildings; $5,682,200, or 10 per cent, for industrial buildings; $4,027,300, or 7 per cent, for commercial buildings; and $2,722,100, or 5 per cent, for educational buildings. New buildings and engineering work started in these states during the first ten months of 1926 amounted to $656,046,700, as compared with $738,463,000 in the first ten months of last year, being a loss of 11 per cent. Contemplated construction planned for the district, as reported in October, amounted to $65,080,800. There was an increase of 17 per cent over September, 1926. However, a decrease of 6 per cent from October of last year occurred.

Building and engineering contracts were awarded last month to the amount of $171,263,800 in the Central West (Illinois, Indiana, Iowa, Wisconsin, Michigan, Missouri, Kansas, Oklahoma and Nebraska). This figure exceeded September, 1926,

by 70 per cent and October of last year by 35 per cent. The more important items in October's building record were: $65,862,800, or 38 per cent of all construction, for residential buildings; $38,328,400, or 22 per cent, for public works and utilities; $23,973,400, or 14 per cent, for industrial buildings; $20,223,900, or 12 per cent, for commercial buildings; and $9,075,000, or 5 per cent, for educational buildings. The Central West had $1,387,787,300 in contracts for new construction work during the first ten months of 1926, which was an increase of 10 per cent over the amount ($1,257,987,800) for the corresponding period of 1925. Contemplated construction planned for these states as reported in October, amounted to $185,398,300. This was 7 per cent in excess of September of this year, but 4 per cent below October, 1925.

The total volume of construction contracts let in the Southeastern States (the Carolinas, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas and Louisiana) during October amounted to $48,146,300. There were decreases of 16 per cent from September of this year and 37 per cent from October, 1925. Included in last month's building record were the following important classes of work: $15,330,500, or 32 per cent of all construction, for residential buildings; $12,785,300, or 27 per cent, for public works and utilities; $7,810,000, or 16 per cent, for commercial buildings; $3,223,800, or 7 per cent, for industrial buildings; and $2,549,000, or 5 per cent, for educational buildings. New building and engineering work started in this territory during the first ten months of 1926 reached a total of $638,706,200, as compared with $653,860,000 in the corresponding period of last year, being a loss of 2 per cent. Contemplated construction projects were reported for the district in October to the amount of $63,920,500, being a decline of 21 per cent from September, 1826, as well as a loss of 54 per cent from October of last year.

The Northwest (Minnesota, the Dakotas and Northern Michigan) had $9,776,300 in contracts for new building and engineering work last month. The above figure was 7 per cent in excess of September of this year and 41 per cent above October, 1925. The September construction record included: $3,574,200, or 36 per cent of all construction, for public works and utilities; $3,409,000, or 35 per cent, for residential buildings; $1,043,900, or 11 per cent, for commercial buildings; and $950,000, or 10 per cent, for industrial buildings. Construction started in the Northwest during the past ten months amounted to $93,408,300, which was an increase of 11 per cent over the amount ($84,150,300) for the first ten months of 1925. Contemplated construction projects were reported for the district in October to the amount of $10,892,300. There were decreases of 11 per cent from September, 1926, and 17 per cent from October of last year.

The total volume of construction contracts let in the state of Texas during October amounted to $16,361,000. The above figure showed a decrease of 8 per cent from September of this year, but an increase of 53 per cent over October, 1925. Analysis of the building and engineering record showed the following classes of importance: $7,811,800, or 48 per cent of all construction, for residential buildings; $3,244,600, or 20 per cent, for public works and utilities; $2,382,200, or 15 per cent for commercial buildings; $923,000, or 6 per cent, for public buildings; and $726,000, or 4 per cent, for industrial buildings. Texas had $201,810,300 in contracts for new building and engineering work during the first ten months of 1926, as compared with $157,271,300 in the corresponding period of last year, being an increase of 28 per cent. The 1926 ten month's total of contract awards has already exceeded the 1925 yearly total by the amount of the October contracts. Contemplated new work reported for the state last month amounted to $19,902,400. There were increases of 5 per cent over September, 1926, and 65 per cent over October of last year.

Motion Pictures in the Plant

The value of industrial motion pictures is evident from the growing use of these educational films in all branches of industry. Pictures convey a message to every kind and type of worker. The interest and attention of the men is held by a motion picture, with its variety of action and interesting details. It is, therefore, possible to drive home a lesson much more effectively with motion pictures, especially when a well-chosen, impressively-delivered talk on the subject is given in advance of the picture showing.

When industrial pictures were first developed they dealt almost entirely with technical details and processes. The recent trend is toward making them more interesting by injecting "human interest" features, and so demonstrating the association between man and methods more effectively. Safety films are now largely of this type. Correctness of detail in the picture is also essential.

In the showing of motion pictures on safety, for example, greater success will be obtained if the plant itself is well-guarded and safely operated. Otherwise the workers may accuse the management of failing to provide the safeguards shown and perhaps be inclined to look on the picture with sarcastic resentment.

A wide choice of subjects for industrial films is found in the collections of the National Safety Council, the Y. M. C. A.'s, and other sources. The safety council films are available to members and for most pictures the cost is merely the transportation each way with a nominal rental charge per day used on such films.

The "Screen Supreme"

The "Screen Supreme" manufactured by the Traylor Vibrator Company is a radical departure in its field and embodies new features in screening devices. The feature which is first noticed is the absence of bearings and pulleys, the operating medium being electricity. The screen has a perfect uniform vibration which is obtained from special built stators and armatures for mixed alternating and direct current power. These armatures assembled on the vibrator members are the basis for the perfect uniform vibration which this screen possesses.

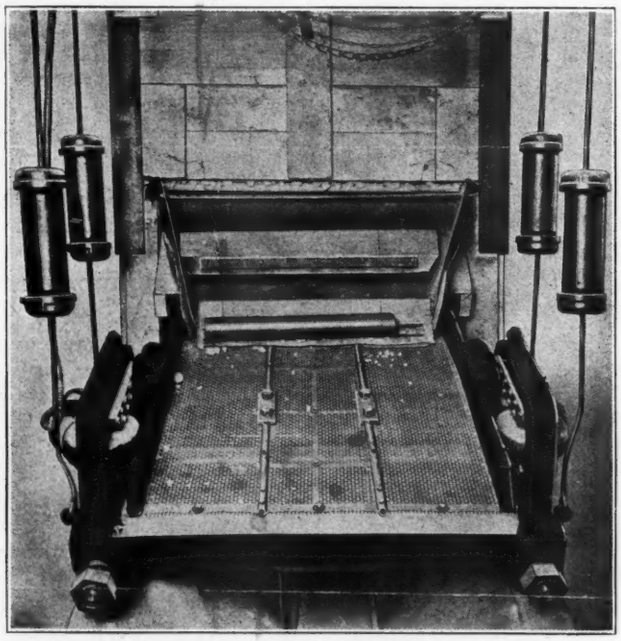
All vibration set up between the screen and super structure or screen platform supports is removed by means of enclosed shock absorbers. Owing to the absence of moving members, such as pulleys and shafts and the perfect uniform vibration the usual heavy construction of a screen is not necessary, the Supreme weighing only 750 pounds. Another valuable and interesting feature is that no grease or oil is necessary which would be the case if bearings with shafts were employed as the driving medium. The machine is also very compactly designed, is easy to install and does not require much floor space.

This vibrationless feature is also valuable from the power using viewpoint as the power required is almost negligible. For example, one commercial type screen, under ordinary conditions, will not exceed ½ horsepower on the maximum load for its operation.

The screen is suitable for dry, wet, light or heavy materials. The machine is made for 110, 220 or 440 voltage and 60 cycle frequency alternating current together with an A. C. Motor, D. C. Generator set of small capacity.

For years laboratories have been in need of a quiet, light and efficient screening unit suitable for investigations. With this in mind the Traylor Vibrator Company has designed a screen especially for this work. Like the plant screen it is electrically operated, is practically noiseless and light in weight as it only weighs twenty pounds. The machine is also built compactly, its length being 14½ inches, width 6 inches and height 9¾ inches. It operates on 110 volt alternating current light circuit and by this arrangement may be easily moved from one place to another.

Four magnitudes of vibration are provided which are obtained by turning an industat indicator. This arrangement permitting four magnitudes of vibration assures the most efficient results in sizing test materials, regardless of the nature of the material. When desired testing sieves may be furnished to any particular requirements other than standard as supplied with the machine.



Traylor "Screen Supreme"

C. L. Bowler Appointed

C. L. Bowler, formerly branch manager for the Republic Truck Sales Corporation factory branch at Philadelphia, Pennsylvania, has been appointed Eastern Zone Manager, according to an announcement by J. C. Haggart, Jr., vice president of the Republic Motor Truck Company, Inc., Alma, Michigan. Mr. Bowler will maintain headquarters at the Philadelphia branch, 26th & Moore Streets.

Dorfan Now With Pangborn

Mr. M. I. Dorfan has recently been appointed engineer of the dust collecting department of the Pangborn Corporation, Hagerstown, Maryland. Mr. Dorfan, formerly connected with the Allis-Chalmers Manufacturing Company and other manufacturers of dust collectors, has had a wide experience in this field and his knowledge of this particular industry will no doubt be of great service in his new connection.

M. I. Dorfan

Handbook of Hoisting Data

An engineering handbook of practical hoisting data has been prepared by the Ersted Machinery Manufacturing Company, manufacturers of the Hyster, an automotive type hoist for attachment to the front end of the Fordson tractor.

While the book was primarily prepared for Hyster users or prospective users, it will be of interest to all operators of hoisting equipment who are interested in modernizing their equipment and reducing their operating costs. The application of simple, but practical and inexpensive hoisting methods to engineering projects, construction work of all kinds, and the industries are shown in this book, while several pages are devoted to useful hoisting data and tables.

Parker Goes with Rollway

The Rollway Bearing Company announces the appointment of John Parker as its New England representative. Mr. Parker has had a long and varied engineering experience, including eleven years with Brown and Sharpe, which should be of great service in his new connection.

New Stripping Shovel

A new 6-yard stripping shovel, readily and conveniently convertible into a dragline, has recently been introduced by the Bucyrus Company. This new stripping shovel is known as type 200-B and like the 320-B, is equipped with box-girder boom and outside dipper handles. However it is built for faster digging on jobs where a smaller revolving shovel has not sufficient range and where an 8-yard shovel is larger than needed. Strip mine operators, who have investigated this machine, believe that it will minimize the operating cost in that field.

The type of boom that the new machine uses is much lighter than a split-boom of equal strength, and is especially adapted to withstand severe bending strains and tortional loads. This construction is designed to permit of operation with less counterweight which in turn will reduce the flywheel effect frequently encountered and therefore the shovel can swing surprisingly fast.

The 6-Yard Stripping Shovel Operating as a Dragline

New 6-Yard Stripping Shovel in Operation

The change from a stripping shovel to a dragline, in the shovel, can be made by a few minor adjustments in the main machinery, and a change in the boom equipment. As a dragline, the shovel is constructed to be especially adapted for digging or stripping ore, coal, and phosphates. The new shovel may either be mounted on four wheel trucks or caterpillars, according to individual specification demands. Both types of mountings have three point support which reduces the load and wear on the trucks when the loaded dipper swings over the corner of the base.

The Ingersoll-Rand Line

For a great many years, Ingersoll-Rand Company has been in the field of manufacturing mining, quarrying and contractors' machinery. The Ingersoll-Rand line of portable air compressors is made up in sizes delivering 44 cubic feet to 310 cubic feet per minute. The smallest size will run one small rock drill, while the largest will operate four rock drills plus furnace and sharpener equipment.

The line of jackhammer drills includes six different sizes, ranging from the light BAR-33 to the heavy DDR-13. There are available drills for all types of rock, and for holes to a depth of 25 feet. Each of these drills will replace from ten to twenty-five men working by hand. They hit hard, drill fast, and stay on the job day after day with very little attention and almost no upkeep cost.

To sharpen the steels, there is available, the Ingersoll-Rand number 33 sharpener and number 5-F oil furnace. With these devices, a capable blacksmith can furnish all the sharp steels necessary for any job. In addition to the equipment for drilling rock, Ingersoll-Rand Company makes the CC-35 paving breaker for tearing up concrete roads; the 56-H clay diggers for slicing out hard tough clay, and the number 22-SRT back fill tampers for hardening up filling. Any one of these machines replaces from five to ten men.

As auxiliary equipment there is the single or double drum "Little Tugger" hoist, which operates scrapers for either filling or excavating, and the big X-71 wagon drill for drilling holes down to 35 feet. Because of its several large factories and widely distributed branches, the company is able to render unusual service, supplying most orders from stock.

Botfield Appointments

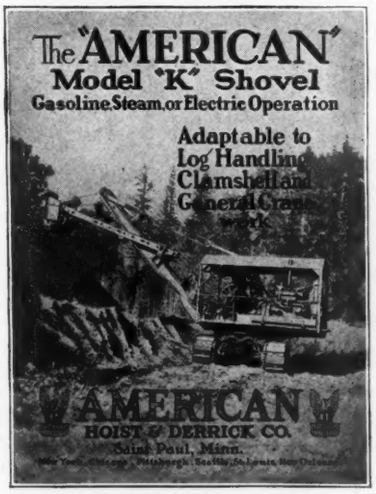
The Botfield Refractories Company announce the following appointments as distributors in the respective territory designated: The Westwater Supply Company, 150 North Third Street, Columbus, Ohio, for Columbus and vicinity; The Klinger-Dills Company, 129-131 North Jefferson Street, Dayton, for that city; Coan Equipment company, 236-242 Murray Street, Fort Wayne, for Fort Wayne and vicinity; and for Cleveland, The Cleveland Tool and Supply Company, 1427-1437 West Sixth Street, Cleveland.

Gilbert H. Unruh is now permanently located in Baltimore, Maryland, as representative for the Link-Belt Company.

Pennsylvania Pump and Compressor Company have recently appointed Lee and Clark, 549 Washington Boulevard, Chicago, as their representative in the Chicago district.

American Model K Shovel

The American Hoist and Derrick Company has recently issued a catalogue describing their model "K" shovel. This machine is built for either steam, gasoline or electrical operation. Power for the gasoline shovel is supplied by a 75 h.p. 4 cylinder 5¾ by 8 inch Waukesha motor, operating at 900 r.p.m. with power take-off and clutch. The clutch is of the disc friction type. By means of easy operating asbestos fabric lined band frictions, the necessity of a reversing engine is eliminated, each function of the machine, traveling, slewing and lifting loads being made under its own individual clutch. The deck on which all machinery is mounted is a single heavy semi-steel casting, heavily ribbed and forms a rigid platform for the machinery.



All controlling levers are banked at the forward right hand corner of the deck, giving the operator a full view of the work at all times. Each lever except the boom hoist lever, performs two distinct functions. For instance, pulling one lever toward the operator causes the machine to back up. Pulling the slewing lever toward the operator causes the machine to revolve in one direction, and pushing the lever from him reverses that motion.

The machine is capable of traveling, slewing, hoisting, crowding and boom raising at the same time, and of reversing any or all of these motions independently of any other, without stopping the motor. The tread frames are steel and the chain treads are made from steel castings assembled with hardened steel pins. The machinery deck revolves on conical steel rollers, enclosed and protected from weather and dust. Ample means are provided for the lubrication of this roller bearing and cages. The boom is made entirely of steel, the lower end being spread to reduce swinging strains.

Details of the shovel are as follows: Radius of tail swing from center of rotation to the rear corner of machine is 10 feet 3 inches. Working range is: maximum digging radius 32 feet, maximum dumping radius 30 feet 6 inches, maximum dumping height 20 feet 5 inches and maximum digging depth 9 feet 2 inches. Slewing speeds are 1 to 3 r.p.m. depending on conditions and roads. Hoisting capacities are 7,500 pounds at 200 feet per minute on a single line and 15,000 pounds at 100 feet per minute on a 2 part line. The approximate weight is 36 tons.

The specifications for the steam operated model "K" shovel are the same as given except in place of the gasoline motor the steam machine has a 7 by 8 inch double cylinder engine, a 45x91 inch A. S. M. E. boiler and 4½x5 inch crowding engine on the boom.

New Incorporations

Blue Diamond Co. of Washington. Lime and rock. $2,100,000. (Corp. Trust Co. of America, Wilmington, Dela.)

Pre-Cast Tile-Marble-Stone Co. W. J. Flynn, N. L. Kalman, E. R. Bayer. $100,000. (Filed by F. A. Muldoon, 3029 Third Ave., New York City.)

Corydon Crushed Stone & Lime Co., Corydon, Ind. $15,000. Quarry and produce crushed stone. Charles A. Keller, Ed S. Bulleit, Edgar L. Miles, Will J. Bulleit, C. A. Quebbeman.

Central Park Sand & Gravel Co., Mineola, N. Y. $5,000. N. Pellico, N. A. Parks, C. Feyer. (Filed by L. A. Feyer, 1515 E. 28th St., Brooklyn, N. Y.)

Beachview Tile & Marble Co., Inc., 1158—65th St., Brooklyn, N. Y. $5,000. Peter Spinelli, Vincenzina Morrealle, Vincenzo Morrealle.

D. Feigenbaum, Brooklyn, N. Y. $5,000. Tile and marble. B. H. Schor, W. Shorenstein. (Filed by Turkat & Diamond, 350 Stone Ave., Brooklyn, N. Y.)

Walters Mfg. Co., 541 Market St., Camden, N. J. $100,000 pfd. Manufacture building blocks, concrete and stone products, etc.

Arrow-Head Gravel & Sand Co., Plattin, Mo. $100,000. Joseph C. Louis, Charles G. Milligan.

Coogan Gravel Co., 1020 Peoria Life Bldg., Peoria, Ill. $75,000. Sand and gravel, etc. P. M. Coogan, F. G. Bruninga, DeEtta E. Clark.

Penn Limestone Co. Dr. U. S. G. Bieber, Kutztown, Pa. $100,000. Dr. Bieber is owner of Kutztown Stone Co., Kutztown, Pa.

National Silica Sand Co., Mineral Ridge, O. Incorporation papers issued at Columbus, O., to mine or quarry building materials, limestone, iron ore, coal, and other minerals. $200,000. William Banfield, Steubenville; H. F. Banfield, Wellsfield; Walter G. Banfield, Toronto; L. E. Cline, Mineral Ridge.

Southwestern Consolidated Graphite Co., Boston, Mass. 1000 n.p.v. Russell Burrage, Beverly; Montgomery Reed, Boston; Ernest J. Massey, Boston.

Hutchinson River Material Co., Mount Vernon, N. Y. $20,000. Building materials. F. A. Behrens, A. Behan. (Filed by W. J. Lamy, 48 Wall St., Manhattan, N. Y.)

Clancy Sand & Gravel Co., Inc., Flushing, N. Y. $2,000. William A., Chas. J., Frank J. Clancy, Flushing, N. Y.

Peerless Sand Co., Dover, Dela. $200,000. (Capital Trust Co. of Dela.)

C. M. Hughes and Company, Nashville, Tenn. (Buying, selling and dealing in sand, gravel, cement, plaster, brick and other materials of construction.) Capital, $100,000. Incorporators: Mrs. Sue W. Hughes, John J. Lowe, F. C. Cowan, J. L. Fossick and Albert A. White.

Napoleon Granite Company, Napoleon, Ohio. Capital, $10,000. Incorporators: K. D. Parker, Leroy Shreves, N. Shreves, G. W. Stockhan, Ruth Miller.

Osgood 1 Yard Shovel

The Osgood Company has recently issued Bulletin 2620 describing the 1 yard heavy duty gasoline or electric shovels which this company manufactures. These machines are designed so that they will provide, in addition to a shovel, efficient service as a crane with hook block or with clamshell bucket; as a dragline excavator and as a back hoe. On the gasoline shovel a six-cylinder special 65 h.p. Osgood engine is used. When electrically driven, for A. C. operation a squirrel cage induction motor rated at 40 h.p. is used and is controlled by a push button starter. When the power is direct current a 40 h.p. constant speed motor is used with push button starter. Either electrical installation is protected by over-load and no-voltage relays. On both the gasoline and electric powered shovels the machinery is driven through a silent chain.

Specifications of the shovel are as follows: Length of boom 20 feet; length of handle 15 feet; dipper capacity 1 cubic yard; overall height, boom down 11 feet 8 inches; rear end radius 10 feet; width of cab, 9 feet; overall width of truck 9 feet; overall length of truck 10 feet 10 inches; width of tread belts 24 inches and domestic shipping weight 67,000 pounds.

Great Lakes Portland Cement Installs Mammoth Crane

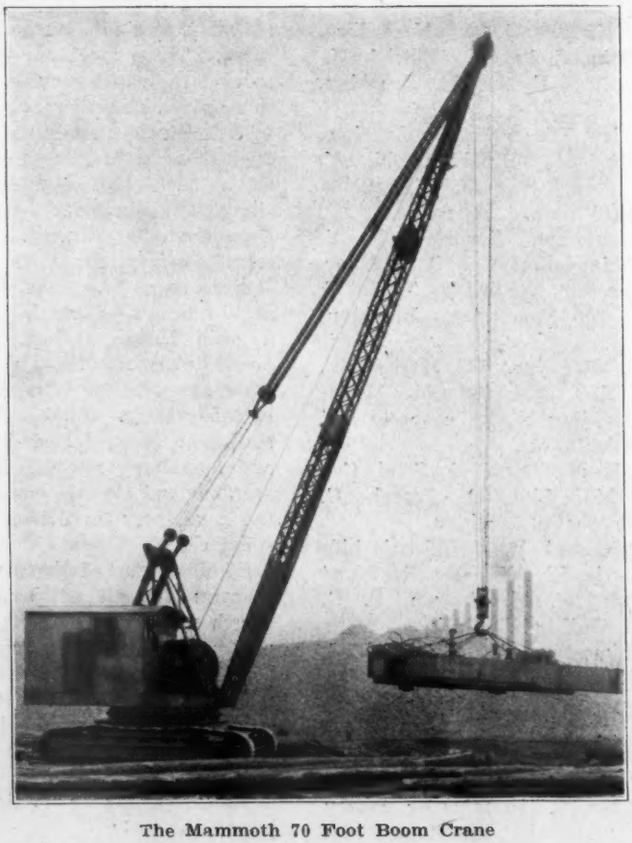
One of the largest crane installations in the Portland cement manufacturing industry is that now being furnished the Buffalo plant of the newly organized Great Lakes Portland Cement Company by the Orton Crane and Shovel Company.

The equipment consists of two electrically operated gantry cranes, each equipped with 65 foot booms and 4 cubic yard clamshell buckets and one 30 ton crawling tread gasoline operated locomotive crane equipped with 70 foot boom and 2½ yard clamshell bucket.

The gantry cranes will be used for unloading boats and stocking material, each machine having a capacity of 350 tons per hour. The crawling tread crane is used for erecting the plant and later for reclaiming stone and loading cars. A unique feature of the installation is the use of the crawling tread crane in setting up the large gantry cranes.

Each gantry crane is electrically operated by means of a single 150 h.p. General Electric motor. All functions of the crane, that is hoisting, traveling, swinging, raising and lowering the boom are accomplished by means of double friction clutches. Each crane travels on four standard MCB trucks on two standard gauge tracks spaced 20 feet center to center. The wheel base is approximately 26 feet and the clearance under the girders 22 feet.

The crawling tread machine is equipped with 133 h.p. 6 cylinder heavy duty gasoline motor manufactured by the Climax Engineering Company. The crawling tread width is 16 feet and has an overall length of 18 feet. The total weight of the crane is 135,000 pounds and is said to be the largest crawling tread type used exclusively for locomotive crane purposes.

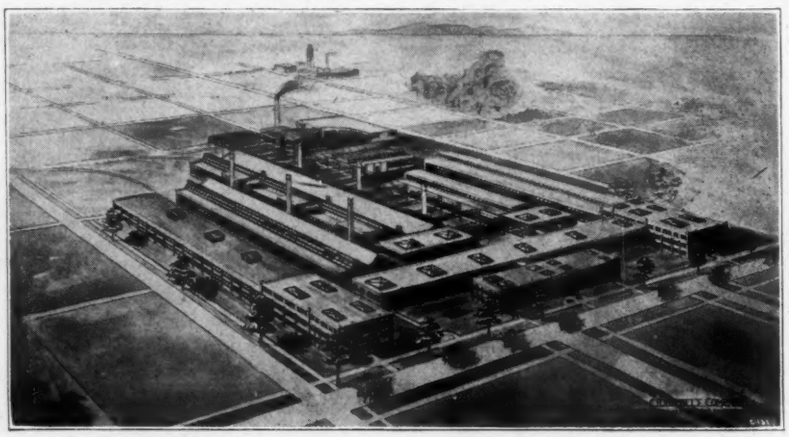


The Mammoth 70 Foot Boom Crane

New Engineering Building For Chain Belt

The Chain Belt Company has started work on a new engineering building at its West Milwaukee works. The building will house the steel fabricating and assembly departments, drafting room, and general engineering offices of the contract division of its business. This is the third major unit to be erected on the 59 acre West Milwaukee site, and is part of the general plan to gradually move the downtown Milwaukee plant located at 16th and Park Streets, to the large tract at West Milwaukee. When the engineering building is completed, approximately half of the organization will be located at the West Milwaukee works.

The new unit will be of steel, brick, and glass construction with approximately 80 per cent of the roof and walls in glass. Approximately 240 tons of steel are included in the specifications. It will be 308 feet long and 120 feet wide with the exception of the office building which will be 144 feet wide.



Chain Belt Company, New Engineering Building

Link Belt Increases Range of Stock Drives

The Link Belt Company announces that, as a result of demand from the trade, it has extended the horse power range of Link Belt silent chain drives available from distributors stock, from its present scale, ½ to 10 horsepower, to practically any reduction from 1 to 1 up to 7 to 1.

Mr. James S. Watson, Manager of the Silent Chain division, recently stated that it was now possible to obtain Link Belt Silent Chain drives from distributors' stocks, in practically any city in the United States within twenty-four hours.

New Hardinge Office

The Hardinge Company announce that after November 1st, the Salt Lake office of this company will be located in the Continental Bank Building, 200 South Main Street, with Mr. W. L. Penick in charge.

Bay City Tractor Shovel

The Bay City tractor shovel, manufactured by the Bay City Dredge Works, is being announced to the public following a period of exhaustive and severe tests. It is the design of Mr. John W. Fairbanks, who has previously developed earlier models of tractor shovels.

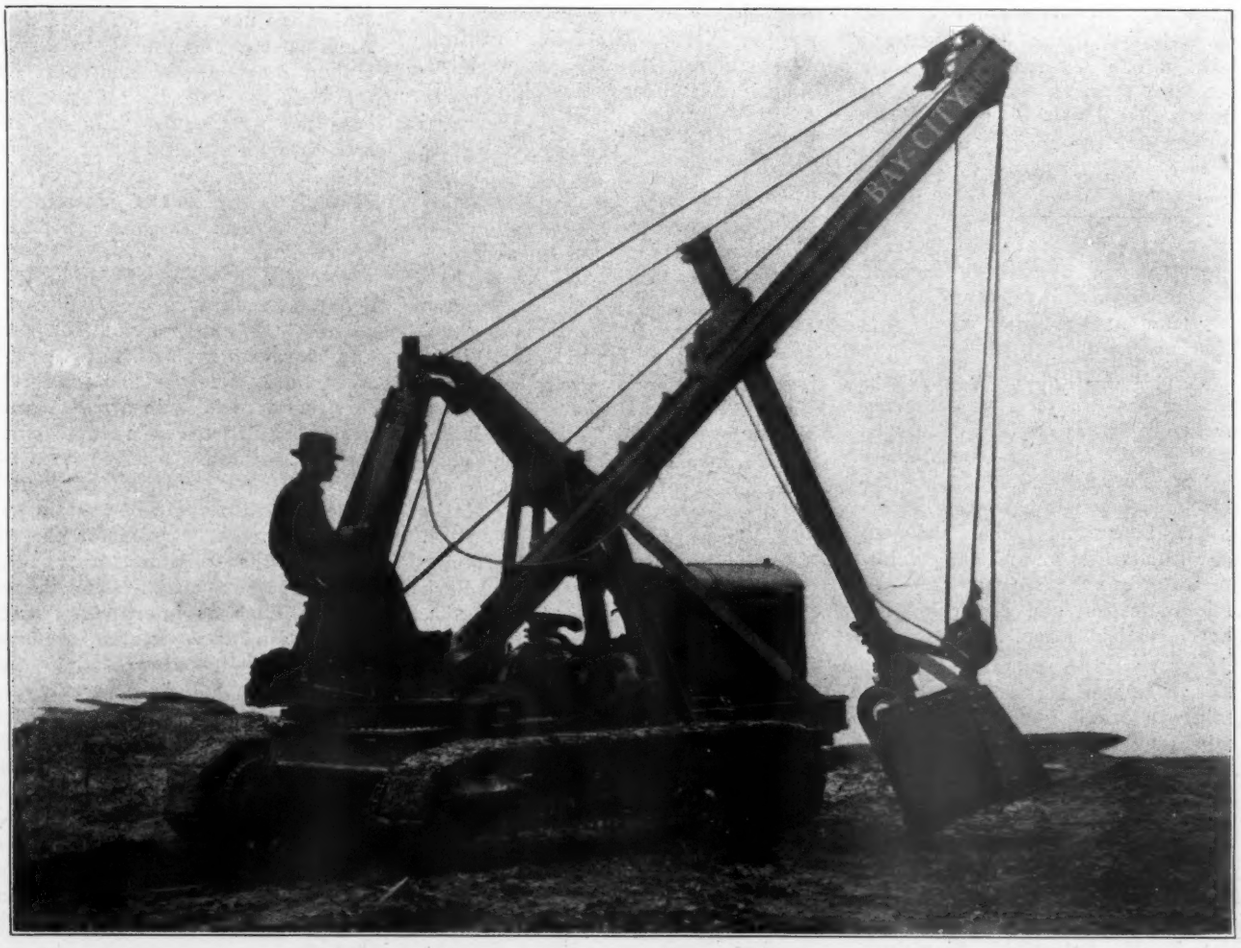
The tractor shovel idea is not new. Earlier tractor shovels have met with indifferent success, due to inexperience in design and manufacture, or lack of sufficient motive power for general contracting service. The Bay City is designed by an experienced big shovel engineer, and equipped with sufficient tractor power to give universal satisfaction; and manufactured by a company with many years of experience exclusively in the dredging and excavating field.

This machine is built around an International McCormick-Deering Tractor, which supplies the motive power and provides three propelling speeds, the fastest of which is 3½ miles an hour, through its selective transmission. All of the operating machinery is located on a revolving bull-wheel, which is above the machinery frame. The operator revolves with the machinery, which swings through an arc of 270 degrees. This three-quarter circle swing permits full circle utility and part circle economy. The shovel can dig or load opposite the rear end of the crawlers. The machine is built throughout of special steels with alloy shafting; forged, heat-treated and machine-cut gears and Timken roller bearings. It is equipped with shovel and will make five bucket trips per minute, and with full length steel crawler treads 9 feet long, with tread rollers, enclosed to keep out dirt. The operating machinery, gears and bearings are also enclosed under a removable metal hood for protection from weather and dirt.

The machinery is strictly one-man operated, and can be run on kerosene if desired. The shovel boom is 15 feet long, permitting the shovel to cut at a height of 17 feet, or dump at a height of 15 feet. Crowding is accomplished by means of a steel worm and bronze worm gear running in oil and connected with the machine by shafts and gears. This crowd is reversible and positively self-locking.

The Bay City tractor shovel can be quickly converted into a crane, dragline or backfiller, by removing the shovel boom and crowd and putting on a 25 foot crane boom. Power boom hoist mechanism is provided for either shovel or crane. The machine is intended to fill long felt needs for a light, small and fast convertible excavator for general excavation, loading materials from stock piles, loading or unloading cars, excavating or backfilling small sewers, curb trenches, etc. It is particularly adapted for the excavation of house basements. It can move to a job three miles away in less than an hour's time, and its high propelling speed and compact design make it suitable for use on small jobs where the installation of a heavy, high-priced machine is not warranted.

The dipper capacity is three-eighths cubic yards water level measure, or practically one-half yard heaped. The machine weighs 8 tons and is capable of digging very hard material. Present optional bucket equipment includes shovel, clamshell or back-filler scraper. The Model 16-B ¾ yard convertible excavator, featured with skimmer and ditcher buckets, will still be manufactured by the Bay City Dredge Works. The tractor shovel has been developed to provide a smaller machine for smaller jobs. The tractor will be sold and serviced by International Harvester Company branch houses, as well as by Bay City Dredge Works representatives.



New Bay City Tractor Shovel

Discuss Road Improvements In Washington This Month

Paving of secondary roads to relieve overburdened trunk line highways in congested districts will be one of the subjects to receive chief consideration at a joint meeting of the American Society for Municipal Improvements, The Asphalt Association, the Association of Asphalt Technologists and other organizations to be held in Washington, November 8th to 12th. The meeting will bring together between two and three thousand road and street experts for the discussion of many problems confronting the municipalities of the country.

"A glance at the highway activities," says J. E. Pennybacker, general manager of The Asphalt Association, who, with C. W. S. Sammelman of St. Louis, secretary of the A. S. M. I., has charge of the detailed arrangements, "indicates a strong leaning toward concentration of expenditures on trunk lines. This leaves the secondary roads to shift for themselves and causes traffic to seek the trunk lines to the congestion of the latter. This congestion is actually driving pleasure traffic off the highways. Motorists who otherwise would be enjoying drives on back country roads are kept at home because of the congestion at important points on the trunk lines.

"The great trunk line highways which parallel railroads have their place and serve a vast stream of purest traffic, interurban trucking and pleasure riding for cities and towns but, in general, the roads which serve best the rural needs are those which lead to the railroad stations. These farm-to-market roads make up that great class known as secondary and this class of highways should be receiving increased attention on the part of all concerned."

The matter of planning and constructing paved streets to accommodate safely future traffic will also be a leading topic at the sessions. Other subjects to be considered during the week, include street inspection, lighting, cleaning and snow removal, traffic regulation, sewers and sanitation, water supply, garbage disposal, public recreation and city planning, finance and legislation.

Secretary of Commerce, Herbert Hoover, has been invited to make the opening address. Other principal speakers will be U. S. Senator George H. Moses of New Hampshire, chairman of the Senate Committee on Post Roads; Arthur W. Blanchard, professor of highway engineering, Michigan University, and president, American Highway Traffic Association; R. H. Simpson, chief engineer, Columbus, Ohio; E. E. Butterfield, Municipal Chemist, New York City; Gene Abson and H. W. Skidmore of the Chicago Paving Laboratory; R. K. Compton, director of public works, Richmond, Va.; C. H. Henderson, chief engineer, Rhode Island State Board of Public Roads; Francis P. Smith, New York City; J. D. Black, Chattanooga, Tenn.; J. B. Pridgen, North Carolina State Highway Department; S. E. Fitch, Jamestown, N. Y.; R. M. Smith, Ontario Provincial Highway Department; A. T. Goldbeck, National Crushed Stone Association; C. M. Pinckney, chief engineer, Borough of Manhattan, New York; F. B. Bosch, Harrisburg, Pa.; W. J. Emmons, U. S. Bureau of Public Roads, Washington, D. C.; W. E. Rosengarten and Prevost Hubbard, New York City; W. W. Horner, chief engineer, St. Louis; B. S. Russell, Cleveland, O.; A. F. MacAllum, Ottawa, Can.; A. K. Vickery, city engineer, Denver, Colo.; H. F. Harris, Trenton, N. J.; N. S. Anderson, South Carolina Highway Department; Jay Downer, chief engineer, Westchester County Park Commission, New York; J. M. Page, chief engineer, Oklahoma Highway Department; I. W. Patterson, Meriden, Conn., and F. E. Everett, Commissioner and state engineer of New Hampshire. Among those who will preside at the sessions are: C. G. Sheffield, New York, president, The Asphalt Association; J. H. Cranford, Washington, D. C., ex-president, American Builders' Association; R. Keith Compton, director of public works, Richmond, Va., and Francis P. Smith of New York.

Speakers listed for the sessions of the American Society for Municipal Improvements include: Julius Adler, Philadelphia, Pa.; H. E. Breed, New York City; A. R. Hirst, Des Moines, Iowa; Thomas H. MacDonald, chief, U. S. Bureau of Public Roads, Washington, D. C.; A. W. Dow, New York; Henry Welles Durham, Managua, Nicaragua; W. E. Worcester, Philadelphia, Pa.; W. A. Brownfield, Louisville, Ky.; Prof. Harry Tucker, North Carolina State College, Raleigh, N. C.; T. J. Wasser, Jersey City, N. J.; F. A. Reimer, East Orange, N. J.; Major C. H. Brown, chairman, City and Park Planning Commission, Washington, D. C.; E. A. Fischer, Rochester, N. Y.; P. L. Brockway, city engineer, Wichita, Kans.; F. O. Eichelberger, city manager, Dayton, Ohio; G. A. Parker, Hartford, Conn.; E. R. Kinsey, president, Board of Public Service, St. Louis, Mo.; C. C. Pashby, city clerk, Memphis, Tenn.; James R. Pollock, city engineer, Pontiac, Mich.; Henry W. Taylor, New York City; George B. Earl, New Orleans, La.; R. B. Morse, Hyattsville, Md.; J. Donohue, Sheboygan, Wis.; William Rudolfs, New Brunswick, N. J.; J. R. Boyles, Baltimore, Md.; J. B. Hawley, Fort Worth, Tex., and L. T. Leis, Playground and Recreation Association of America, Chicago, Ill.

International Trade Exhibition

The City of New Orleans on February 1 of this year introduced a valuable and interesting enterprise to promote international trade, especially between Latin America, which includes Mexico, Central America and other countries to the south of Louisiana. This undertaking is known as the New Orleans Permanent International Trade Exhibition. The exhibition is a non-profit, cooperative institution. It is endorsed by the United States Government, Commercial and Trade organizations and the city government of New Orleans.

The intent and purposes of the exhibition are to establish a permanent trade market, or what may be termed a display window for products not only of the United States, but the whole world, with the especial aim of establishing better trade relations between North and South America.

Already several hundred manufacturing concerns have their products on exhibition. The countries represented are not only North and South America but foreign as well. The United States Government has cooperated in the undertaking by turning over the Army Base building, rent free, through a special act of congress. This building is of six stories, each 140 by 600 feet and of fireproof construction, with automatic sprinkler protection.

The charge for exhibiting is three dollars a square foot a year, and if desired, the exhibits will be placed and furnishings provided at cost. Heat, light, telephone and interpreter services, as well as insurance against fire and theft are afforded to exhibitors. The income received from this space letting, other than that required for expenditures, will be used in publicity and other service for the sole benefit of the exhibitors.

The services available to the exhibitors, such as interpreters, credit information, transportation problems, parking of goods, locating new markets, etc., will be of great value in stimulating in every way a free interchange of commerce. The exhibition is open every day in the year, admission is free, and efforts have been made to provide for the enjoyment and comfort of visitors such as international and industrial motion pictures, which are shown daily and an adequate restaurant on the premises.

The Schulthess Hydrator

About eighteen months ago their first Schulthess Hydrator was installed in the United States by the McGann Manufacturing Company. Prior to that time there was one of these machines operating in this country and two in Canada. Since the placing of this hydrator by the McGann Company, nine others have been installed by this company. Briefly, the plan of hydration followed by this hydrator is as follows:

The lime is taken just as it comes from the kilns and is fed into the hopper of the hydrator from the hopper. The lime passes into the revolving screen, or breakdown compartment of the hydrator; here, by an addition of water to the lime, the actual breakdown of the lime occurs and all of the lime ¼ inch and smaller in size is conveyed by the ribbon conveyor, which surrounds and is attached to the screen, to the treatment zone of the hydrator. In this treatment zone, the accumulated steam, which is generated in the screen section when lime and water meet, acts as the H_2O supply for the broken down lime which has already left the screen.

It is a known fact that steam or pressure is exerted in the line of least resistance; this is the case in the Schulthess hydrator. When the lime meets the water, pressure results. A small quantity of this pressure rushes to the condenser and stack outlet; here the uprush of steam is met by a baffle which turns back any particles of lime which may have been lifted by the explosion. If, however, the lime laden pressure still continues to find a way of outlet, it is met by sprays of water at different heights in the condenser column. When this lime meets the sprays of water, it drops as heated milk of lime to the bottom of the condenser, and this milk of lime is fed by a pipe into the revolving screen section of the hydrator to furnish heated water for breakdown, instead of cold water.

The balance of the steam which is generated in slacking in the breakdown, or screen section, rushes into the treatment zone of the hydrator. When the broken down lime is conveyed by the aforementioned ribbon conveyor into the treatment zone, this lime satisfies itself by reason of the temperature differences, with the condensed steam which was generated in slacking and which now is confined in the treatment zone, receiving full satisfaction for its H_2O content, and, at the same time, under as near a vacuum as is possible.

The result is a superior hydrate for several reasons, the first of which is that being satisfied with moisture content by treatment in its own steam, and being treated without the presence of foreign particles, which are rejected in the screen section, the lime is subject to treatment under conditions which are different from those usually obtained; namely, a treatment of pure lime without the harmful effects of an admixture of reject materials.

It is necessary to explain at this point that this hydrator eliminates core and overburned and underburned lime which will not break down in contact with hot water, this elimination taking place in the screen section with the result that no imperfections are admixed with the lime and treated with the lime in hydration. Further, in this process of hydration, due to the fact that the lime is broken down naturally with water, there are eliminated those fines of rejected material which are bound to go into any system which uses a crusher to reduce the lime to a particular size.

The Schulthess turns out a nearly perfect hydrate. The conclusion of the National Lime Association, after many experiments and much observation, is that 80 to 90 per cent of lime when properly hydrated will pass through 200 mesh. But with this Hydrator, it has been found that as much as 95 per cent of the hydrate will pass through the 200 mesh.

New Morrow Equipment

The Morrow Manufacturing Company has recently issued bulletins number SG-11 and number 55 describing the screening equipment which it manufactures.

The former bulletin deals with the Morrow Standard sand and gravel screening equipment. This comprises a revolving screen, feeder and settling tank. This complete plant is made in separate units, making it possible to install one or all and have a complete working unit. On the screening unit, rotation of the screen is obtained by a central drive which is mounted on a structural frame, fastened on the main frame of the screen at the intake end.

The screen is revolved by a cast ring gear meshing with a pinion in the central drive. All moving parts are driven from this one drive. On the ring gear is cast a trunnion ring, with machined face on which a steel tire is pressed and held in place by cap screws. By removing these screws, changing of the tire is made easy. The screen is supported at the drive end by the trunnion ring and steel rollers.

The screens, feeders and settling tanks are made in three sizes to give a capacity of 20, 40 or 60 yards an hour. Two types of each size are made, feeder and elevator. Other standard plants can also be furnished with a greater capacity than 60 yards an hour.

In bulletin 55 is described several types of perforated metal screen plates suitable for sizing and grading sand, gravel, stone and the like. Four types of perforations which are commonly used, are illustrated. These are round, oblong, square and diagonal. The round type can be furnished with holes from ¼ inch to 6 inches in diameter with suitable center distances. The oblong perforations range from 1⅛ x ½ inches to 3 x 6 inches; the diagonal slots are from 1⅛ x 1 inch to ⅝ x 1½, and the square perforations have a range from ½ to 3 inches. Each size and type of screen plate is made of a suitable gauge thickness to insure long service without distortion when separating bulk materials.

New Pyrometer Controller

The Bristol Company has recently issued Bulletin No. 348, describing the application of its pyrometer controller model 479 for heat treating steel. This pyrometer controller is used to operate motor driven or solenoid valves for automatically regulating the flow of fuel and air in connection with gas or oil fired equipment, and for operating magnet switches for controlling electrically heated apparatus.

The equipment is suitable for controlling temperatures up to 3,000 degrees Fahr., and is used in connection with all kinds of heat treating processes including annealing, etc. The instrument is provided with an extra long (7 inches) scale which makes it easy to read to a very close degree of accuracy.

To set the pointer to the degree of temperature which it is wished to maintain, it is only necessary to turn an adjusting knob on the outside of the case. The adjusting knob is protected by a spring hinged cover in order that the setting of the pointer may not be accidently shifted.

The Milli-voltmeter movement used is specially designed by "Weston" for controller use. This movement is adjusted so that the pointer swings in a plane absolutely parallel to the switch. As a result, the switch operates with certainty at any part of the scale arc. When it is desired to record the temperatures, up to 3,000 degrees Fahr., obtained during the heat treating operation, either round or strip chart recorders are supplied by the Bristol Company. The round chart is usual for a 24 hour period and the strip chart is a 90 foot roll which gives an unbroken record for forty-five days duration.

Haiss Loader Operating At Gravel Plant

The illustration shows a Haiss loader loading material from the sand pile at Edward Sidebotham and Son's gravel plant at Lomita, California. This company sells washed gravel and sand from their own pit, and "Blue Diamond" crushed rock. Sand and gravel are brought to the plant by a drag bucket on a cable way, and then washed and screened. The gravel of various sizes goes into bunkers, but there is a considerable excess of sand, and this is carried from the screen by a long belt conveyor on a trestle and stored on the ground. The illustration shows the end of this conveyor.

This method of operation gives unusual flexibility to the plant, making it possible to store excess sand very inexpensively, and the loader has a high capacity so that every advantage can be taken of the fluctuation in demand for sand. In Southern California long hauls for sand, gravel and stone are usual. The ability of the loader to fill a large number of trucks early in the morning, as a rule, before the plant starts operation, is a great advantage. The highest possible speed of loading flexibility of operation is to be desired in a loading machine. The simple positive feeding action of the manganese steel feeding propellers, the closely spaced buckets, 16 inches apart, and the great reserve power of the 37 hp. Waukesha engine, ensure the highest possible loading speed at all times. Two cubic yards per minute while loading is average performance, and an occasional load of three cubic yards per minute is not unusual.

Allis-Chalmers Appoints

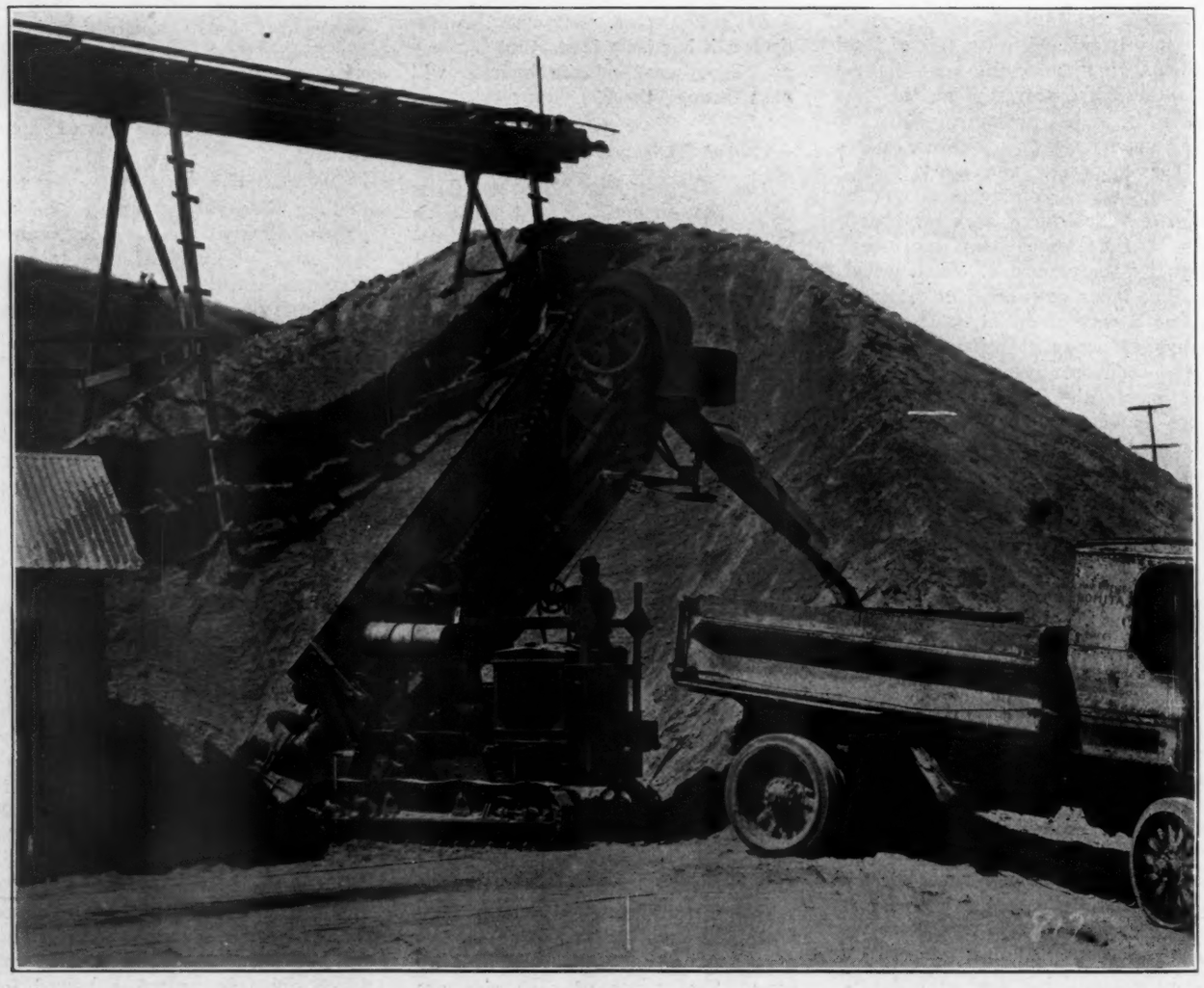
Allis-Chalmers Manufacturing Company announces the appointment of Mr. Ernest Smith as Sales Engineer in the Oruro, Bolivia office. This is a branch of the Company's district office at Santiago, Chile.

This Company also announces the opening of a branch office in Jackson, Michigan, with Mr. L. F. Berry as resident representative. This office, located at 512 Reynolds Building, Jackson, is a branch of the Company's office in Detroit, which is under the direction of Mr. F. S. Schuyler as district manager.

Koro Welding Rods

The Lincoln Steel Company has recently issued a folder describing the Koro electric welding rods which this company manufactures. The feature of these rods is a system of corrugating the rod at regular intervals. This crystallizes the metal between the corrugation, setting up little resistance centers on the rod. This develops a lag in the current which causes the metal to drop off in a steady, rapid stream of pellets.

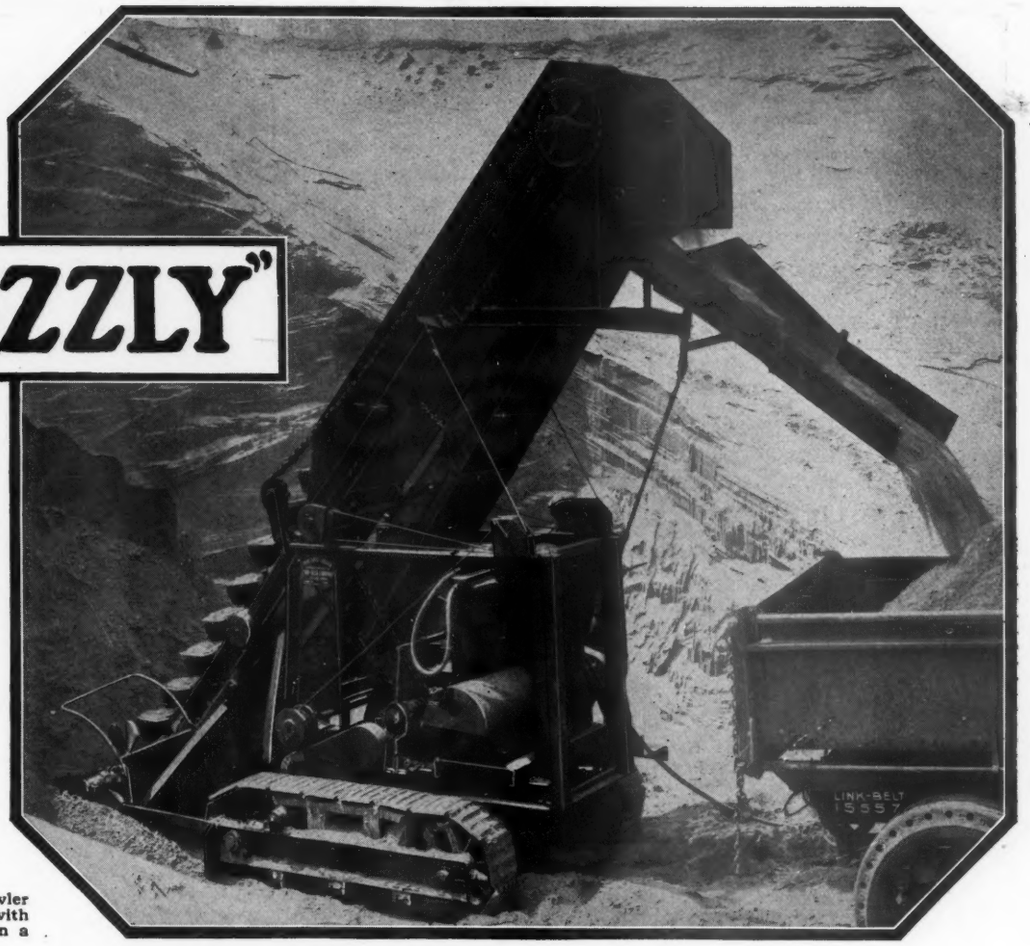
The rods are also coated with a mineral substance. This coating is tough and will not flake off and will withstand rough usage during shipment or in the shop. The covering is a great conductor of heat and electricity. It can be heated to 2300 degrees without melting and when the rod is used for welding the coating, fusing at about the same speed as the metal, gives off an enveloping gas that keeps the current from wasting and protects the molten metal from impurities it otherwise so readily absorbs.



Haiss Loader Operating from Sand Pile

The "GRIZZLY"

Super-Capacity Crawler Loader



Link-Belt "Grizzly" Crawler Loader, loading truck with bank-run mason sand in a sand pit.

Has Saved Upward of $100 a Day in Actual Operation

THIS new Link-Belt Loader is built to meet the most severe conditions encountered in handling sand or gravel. And it's doing it. As the biggest and sturdiest member of the famous "Bear" family, it's living up to its name.

The "Grizzly" is thoroughly equipped for the job, it forces its way into the bank under its own power, while the six-bladed manganese steel feeder fills each bucket heaping full. That means big capacity.

It can go virtually anywhere, due to the full length crawler traction, while the Link-Belt Scraper attachment leaves the pit floor clean and smooth.

The "Grizzly" will serve your material handling needs at a saving unapproached by any other method. It's doing it for *others*—it can do it for you. Write for copy of the "Grizzly" Crawler Loader Book No. 924. Return the coupon.

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